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THE BOSTON CITY HOSPITAL.

MEDICAL AND SURGICAL REPORTS

OF THE

CITY HOSPITAL

OF THE

CITY OF BOSTON.

Third Series.

EDITED BY

DAVID W. CHEEVER, M.D., OLIVER F. WADSWORTH, M.D., AND
A. L. MASON, M.D.

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PREFACE.

In offering to the medical profession the third series of Medical and Surgical Reports of the City Hospital, we have endeavored to present such a selection of Hospital Cases as may be most interesting and useful for comparison and reference.

THE EDITORS.

BOSTON, March, 1882.

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THE PATHOLOGICAL HISTOLOGY OF THE SPINAL CORD.

By S. G. Webber, M.D.

Many of the specimens from which sections have been made for study in preparing this paper came from hospital patients. The design of the paper, and the space at the author's disposal, have made it necessary to exclude all clinical histories. It has also been necessary to refer only very briefly to the investigations of others, and to omit many discussions which would be very interesting. The author has endeavored to give proper credit to others in quoting their views.

The usual method of preparing clear sections of the spinal cord has been employed after the cord was hardened in chromic acid or bichromate of potassa. The drawings have all been made with the camera lucida. The microscope used was made by Hartnack; objective No. 8 was used for nearly all the drawings, except as mentioned below.

NORMAL HISTOLOGY.

The grosser divisions of the cord need not be dwelt upon, nor is it necessary to describe its envelopes, excepting to say that the pia mater, next to the cord and surrounding it, sends processes into its interior, accompanying the blood-vessels distributed to the different parts of the organ. Between the pia mater and the nervous structures of the cord is a layer of connective tissue, thickest where the nerve-roots pass out and at the posterior fissure. This cortical layer is formed of fine fibres, woven into a net-work with extremely fine meshes. Scattered among these fibres are cellular elements. The thickness of this cortical layer is from .01 to .06 millimetre. (Frommann.) (Fig 1, *a*.)

The cortical layer sends processes into the cord accompanying the pia mater, and also others, forming septa (Fig. 1, *b*, *b*), which divide and subdivide, finally forming a net-work of fibrous tissue, which surrounds and supports the nerve fibres, taking the place of the sheath of Schwann. (Bidder, Schultze, Frommann.)

The structure of the connective tissue, neuroglia (Virchow), is one of the most important studies in the normal histology of the cord, in order to obtain a correct basis for the study of pathological processes. It is only within comparatively recent years that the presence of connective tissue in the cord has been generally recognized. (Bidder und Kupffer.) Frommann describes the neuroglia as consisting of a very thick net-work, with narrow meshes, formed in part of interlacing fibres, and in part of cells with numerous processes.

There has been considerable difference of opinion in regard to the structure of the interstitial tissue. Later observers are inclined to the view that this tissue is composed of fibres and cellular elements. My examinations tend to show that this is the correct view.

The fibres of the neuroglia in the white substance of the cord form a net-work in the larger septa nearly as close and fine as in the cortical layer; but as these trabeculæ subdivide, the fibres finally are interlaced around the nerve fibres, and on cross-section the meshes appear more open. The general direction of these fibres is nearly parallel with the nerve fibres; but there is great irregularity, and they cross each other and the nerve fibres at all angles.

CELLULAR ELEMENTS OF THE NEUROGLIA.

NUCLEI.

Nuclei are found scattered through the cortex and the trabeculæ. These nuclei are round or oval; they may have no distinct nucleolus, but are filled with granules, two or three of which are more prominent than the others, and have more or less lustre. The outline of

these nuclei is well defined. They have received the name of myelocytes. (Ch. Robin.) A careful study of these nuclei leads to the conclusion that they are surrounded by protoplasm, apparently without cell-wall.

DEITERS' CELLS.

Besides nuclei, there are found cells scattered throughout the interstitial tissue, which have been named from Deiters, who first described them as a mass of fibres radiating from the nucleus in which there is no nucleolus. These fibres have a firm but delicate appearance, and divide frequently.

Franz Boll (Arch. f. Psychiat. u. Nervenkr., IV., 1873, p. 1) describes these cells, and ascribes to them more importance in the structure of the spinal cord than others. "I recognize in the white substance of the spinal cord no separate connective tissue fibrillæ, and no corpuscles without processes, but only the above-mentioned cell described by Deiters, with its numerous fibrilliary processes." Attached to the fibrillæ were granules, probably of albuminoid nature. He has never seen the processes divide.

C. Lange describes these cells as consisting of a rather small and thin cell-body, often long in form; a nucleus also long. The body of the cell is drawn out into processes, on an average at least seven, separated from each other by relatively deep notches. He says it seems as if these cells and their processes together form the interstitial tissue.

It is necessary to add but little to these descriptions. I have frequently seen nucleoli in these cells; and in many instances, with a high power, have seen two or three fine fibres radiating from the nucleolus. (Fig. 4, *c*.) I have not been able to follow these beyond the nucleus. In most cases, however, only the nucleus is visible, filled with coarse granules, generally situated near one end of the rather long cell.

The number and distribution of these cells is far from uniform. They also vary in size, in the number of processes they give off, and the manner in which they are

grouped together. Sometimes several will be found near each other apparently connected. (Fig. 2.) On longitudinal section, the cells, as well as nuclei, are frequently seen in groups. These cells are found scattered irregularly among the nerve fibres generally, not in the trabeculæ which enter the cord from the cortical layer. The processes form meshes which vary in size according to the size of the nerve fibres which they surround. In the inter-spaces between the fibres are seen, on transverse sections, the ends of fibres running a course more or less longitudinal. With a low power these cut ends present a granular appearance.

Frommann (Untersuch. ü. die norm. u. patholog. Anat. des Rückenmarks, 1. Theil, p. 46) considers the fibres, both coarser and finer, to be cell processes. He believes they are hollow tubes or canals, and that, with the cells, they form a vast canal system for the circulation of the fluids in the spinal cord.[1]

The interstitial tissue is formed of fibres closely woven together, crossing each other in all directions, with cells and nuclei intermingled. Possibly a certain amount of serous fluid contained in this tissue may coagulate on the application of reagents. Granules arising from the coagulation of this fluid may adhere to the fibres, and at times give them a roughened appearance.

NERVE FIBRES.

The axis cylinders, and medullary sheath of the nerve fibres in the spinal cord require no special description, resembling very closely those of the peripheral nerves.

The size of the fibres varies according to the region of the cord under examination, the smallest being in the central posterior columns, where the size is quite uniform. The largest fibres are found along the anterior fissure and the anterior portion of the circumference. In the lateral columns there is the greatest variation in size.

[1] An exhaustive account of the neuroglia may be found in Frommann's work above cited, with details into which it does not seem necessary to enter.

As already mentioned, opinions differ in regard to whether the nerve fibres have a distinct sheath. In fresh healthy specimens I have been unable to discover any such sheath. The fibres have seemed to be closely and immediately enveloped by the neuroglia.

GRAY SUBSTANCE.

The gray substance is composed of all the elements heretofore described, and also of nerve cells. The nerve fibres and the fibres of the neuroglia are irregularly distributed and intermingled. Many of the nerve fibres are reduced to their axis cylinders, and are sometimes so fine as to be distinguished with difficulty from the fibres of the neuroglia.

NERVE CELLS.

The nerve cell consists of a cell body, with one to several processes, containing a nucleus more coarsely granular than the cell body, and which is clearly defined, round or oval; the nucleus contains a finely granular or homogeneous nucleolus, in which may appear a light-colored spot, a sub-nucleolus. At one end of the cell there are frequently coarse yellow granules, especially if the person is aged.

Under fortunate circumstances, from one to three or four fine fibres or lines may be seen arising from the nucleolus or sub-nucleolus, which run a short distance and are lost in the body of the cell. (Figs. 5, 6.) Frommann has described these fibres at length. (Virch. Arch., XXXIII., 1865, p. 168.)

The body of the cell, and, to a certainextent, the processes, are finely fibrillated. These and other minute markings probably change quickly after death.

One of the processes, a short distance from the cell, becomes clothed with a medullary sheath, and takes the structure of a fully developed nerve fibre; the others subdivide into extremely fine fibres, and assist in forming the fine net-work of the gray substance. Opinions differ as to whether these fibres belong to the proper nervous elements. This description applies to the stellate cells; fusiform cells send a process from each end, which can be followed for a long distance without division.

The largest cells with most processes are found in the anterior cornua, and along the external border of the gelatinous substance in the posterior cornua. Fusiform cells, both large and small, are found in the posterior cornua, are almost the only cells in the *tractus intermedio lateralis*, and are also sparsely scattered in the anterior cornua. The smallest cells in the cord are in the posterior cornua, and are fusiform in shape. (Figs. 9, 10.)[1]

COMMISSURES AND CENTRAL CANAL.

The lateral halves of the cord are connected by the anterior or white commissure, and the posterior or gray commissure, respectively anterior and posterior to the central canal, which runs through the whole length of the cord, opening above into the fourth ventricle, below into the posterior fissure. The central canal is clothed with cylindrical epithelium. The epithelium consists of long cells with large nuclei; their free ends have ciliæ projecting into the central canal; from the opposite end proceed fibres which can, in a favorable specimen, be followed into or across the commissures. (Fig. 11.)

Around the central canal is a narrow zone of translucent tissue, *substantia gelatinosa centralis*. (Stilling.) Its translucency is due to the almost entire absence of nerve fibres. The nuclei scattered through this zone may be so multiplied as to obscure the translucency. These nuclei may also encroach upon the central canal, causing it to disappear. Sometimes the epithelium lining the canal increases so as to fill and obliterate it.

VESSELS.

The vessels of the spinal cord do not require special description. It has, however, been a disputed question whether they are surrounded by a perivascular space like the cerebral vessels. His described such a space with a lining membrane or sheath. Leyden has accepted this as a fact. Fig. 12 shows a small vessel, almost a capillary, with a perivascular sheath containing only a few nuclei; the vessel has collapsed.

[1] J. L. Clark has given a very full and detailed description of the distribution of the different kinds of nerve cells. — Philos. Trans., 149, 1859, p. 437.

PATHOLOGY.

NEUROGLIA.

NUCLEI.

One of the earliest changes in the interstitial tissue is an increase in the number, and, perhaps, in the size, of the nuclei and cells; there is also a corresponding increase of the fibrous structure. The nerve fibres in the white substance are pressed apart and do not lie so near each other as in the normal state. (Fig. 13.) Kesteven (St. Barthol. Hosp. Rep., 1872, Vol. VIII.) says this increase of nuclei is probably the starting-point of sclerosis. C. Lange (Schmidt's Jahrb., Bd. 168, 1875, p. 238) describes the increase of free nuclei scattered through the fibres of the reticulum in myelitis ending in softening. They may be grouped together in large numbers, may give rise to a granular appearance, and, he says, are adherent to the fibres.

Most authors do not distinguish between the more advanced and the earlier stages of the degeneration. In the former the nuclei are often increased in number, enlarged in size, and grouped in clusters of two or three to eight or ten. These groups are less common in the earlier stages of the disease. The nuclei are sometimes smaller than normal. In shape they are round or oval, — the long axis only slightly longer than the short axis; when there is a great difference, the nuclei probably belong to blood-vessels.

In the gray substance it is less easy to recognize a slight increase in the number of nuclei, their distribution being less regular and their numbers more numerous, normally, than in the white substance. In advanced stages of disease the increase of nuclei in the gray substance is very evident. (Hayem, Pierret, Charcot and Joffroy, Roger and Damaschino.) Damaschino says they are remarkable for their homogeneous appearance; that they enclose two or three punctiform nucleoli, and show no tendency to fatty degeneration; they are most abundant around altered blood-vessels, adhere to their adventitia, and obscure the observance of their structure. (Mem. de la Soc. de Biol., 1871, p. 49.)

They are also scattered through the whole extent of the diseased tissue without special reference to the blood-vessels. In the gray substance they are smaller, as a general rule, than in the white.

When portions of the hardened diseased cord are teased apart, these nuclei are, in many cases, seen surrounded by small portions of finely granular substance. (Fig. 14, *a*.) It is difficult to decide whether this is a portion of the diseased tissue mechanically adherent or protoplasm; no cell-wall can be seen bounding this adherent granular substance. Charcot mentions that the nuclei are thus surrounded by protoplasm. (Arch. de Physiol., 1871, t. IV., p. 93.)

FIBROUS TISSUE.

The increase of the fibrous tissue of the white structure is easily recognized, as the trabeculæ and meshes enclosing the nerve fibres are thickened. In chronic diseases the fibres are much finer than normal, and are closely interwoven, having an appearance suggestive of felt. The cut ends of the fibres, showing mere points, give a granular appearance to sections of hardened cord. On teasing apart these portions, it is found that the diseased parts are composed of fibres, and not of a granular substance. Where the disease is far advanced this increase of fibres is yet more marked; on transverse section the whole field has a granular appearance, only a small number of fibres are seen crossing the field, sometimes in bundles, sometimes separate; nuclei are scattered over the field. On longitudinal section the fine fibres are seen running parallel with the long axis of the cord, often with a wavy appearance, well described by Frommann. He gives a detailed account of this new-formed fibrillary tissue which is in general very accurate; but some of the appearances I have not found as he describes. (Untersuch. ü. die norm. u. pathalog. Anatomie des Rückenmarks, 2. Theil, 1867, p. 88.) He says that at the border where the change is least advanced, the fibres are thickened, being two or three times the normal thickness, or are bordered by a dully shining, sharply defined, translucent substance. From the edge of many fibres arose small excrescences or processes. A

similar appearance is described in the more advanced stages of the disease; he also mentions individual, free fibrillæ running more or less transversely; he also speaks of fibres containing fibrillæ, and of a granular "foundation substance."

I have been able to find only fibres, nuclei, and cells. The foundation substance, or membrane, is represented, at most, only by a fluid which bathes the fibres, and is coagulated by the reagents used in hardening. The fibres have been uniformly smooth, without the knotted processes. When separated one from another they were no larger than in the normal condition, perhaps were rather thinner, and nothing resembling fibres composed of fibrillæ were seen (excepting as shown in Fig. 21, which will be described later). The semi-translucent border which he describes was not seen. These fibres generally run parallel with the nerve fibres, or the remaining axis cylinders, and have the wavy appearance described by Frommann. Comparatively few run transversely. This longitudinal course of the fibres fully explains the granular appearance of transverse sections.

In *acute* degeneration, the neuroglia fibres have been described as swollen, thickened, and twice, or more than twice, as large as normal. These swollen fibres, three or four times the normal size, had lost their shining appearance, had taken a finely granular character, and were strongly colored by carmine; in many places neighboring fibres had run together so that there were patches where was a continuous connective tissue substance. (Frommann, Hayem.)

CELLS.

The neuroglia cells are increased in size and number. These cells sometimes seem to consist merely of an increase of protoplasm around the nuclei without clearly defined cell-wall, and without processes. These simple forms of cells can be seen much the more readily in longitudinal sections.

DEITERS' CELLS.

Previous to the description of these cells as normal constituents of the cord, Rindfleisch had seen and described them as one of the products of inflammation. (Virch.

Arch., XXVI., 1863, p. 474.) They have been described by Charcot, Jeffroy, Hallopeau, Gombault (with Charcot), Schüle, Maier, Lange, Frommann, and others. These descriptions do not agree in all respects; but the differences can be explained by the fact that the cells have been seen in different stages of change, or after different methods of treatment.

Joffroy (Mem. de la Soc. de Biol., 1873, p. 77), in myelitis produced artificially in a dog, found a great number of long and very fine fibres, not ramified, starting from a centre represented by a very limited mass of protoplasm, which was very strongly colored by carmine; these contained neither nucleus nor nucleodus. He considered these to be Deiters' cells, and that they play an important part in the evolution of inflammation.

Maier (Virch. Arch., LXI., p. 1) speaks of large, star-shaped bodies, with many processes, having an amorphous, granular contents, the cell body frequently including other cell structures. He says these are the hypertrophied cells of the neuroglia.

These spider cells are enlarged and increased in numbers in both acute and chronic inflammation, in both the white and the gray substance. They may contain a single nucleus, generally eccentric, almost always oval, generally finely granular, sometimes with two or more granules larger than the others; rarely there is a distinct nucleolus to be seen. From this cell arise processes radiating in all directions; sometimes the cells are homogeneous and show no structure, in which case they imbibe carmine so as to present a smooth, red, amorphous appearance, with no markings nor lines excepting the nucleus. The outline of the cell is irregular, the cell-wall falling in towards the nucleus between the processes, and sometimes the cell spreading out into broad tracts of protoplasm, from which arise several processes. These processes vary in number and delicacy, and are so fine and numerous as to be counted with difficulty (Fig. 15, *a*); then again they are finer and coarser; occasionally, though rarely, they subdivide (Fig. 20); some can be followed only a short distance, others for a long distance. Sometimes these cells

are fusiform in shape, with the processes grouped at the ends (Fig. 16); these closely resemble cells described by Boll, found in the brain and spinal cord of oxen, sheep, etc.

Occasionally these cells and their processes are much swollen and are irregular in their course, being twisted and doubled upon themselves so that it is impossible to follow them far; the nucleus is much obscured, and is sometimes invisible. (Fig. 17.) Such cells imbibe carmine readily and acquire a deep red color.

In a case of sclerosis, cells were seen with two or more nuclei. These cells were relatively large, and were found at the boundary of the diseased tissue. Many cells contained two nuclei, showing perhaps the commencement of division. (Fig. 15, *a*.) At (Fig. 18) is drawn a cell with five round nuclei closely grouped together; a careful examination showed these to be all in the cell. The cells had a perfectly homogeneous appearance without markings nor granules; from some of them arose processes wider than are usually seen, having the same homogeneous structure. These cells resembled more closely than others the appearance which might be caused by a liquid forcing itself into the interstices of the neuroglia, and spreading out into the free or cellular spaces around the nuclei. Some authors indeed consider these cells to be channels for the nutritive fluids, or lymph; hence the name "Saftzellen."

In other instances these cells seem to have undergone atrophy, the cell body being only slightly larger than the nucleus, only a few processes remaining. (Fig. 19, *a*.) These are found where the disease is far advanced.

Owing either to differences in structure or changes during the hardening it is often not possible to see the nucleus in these cells, there is only an appearance of fibres crossing each other, or taking their origin from a confused knotted centre; hence the name knotted points (Knotenpunkten), given by some authors.

Joffroy (Mem. de la Soc. de Biol., 1873, p. 77) says that Charcot has found these cells in every case of sclerosis and ataxia where he has sought them.

In sclerosis these spider cells are often united by one or two of their processes with the sheaths of the blood-vessels. (Fig. 20, *s*, 24, *c'*.) This connection of the cells with blood-vessels would confirm the view that they are lymph canals. (Arndt, Frommann, Leyden, Meynert.) Arndt gives as the reason for believing them to belong to the lymph system that they undergo hyaloid degeneration when the vessels are thus affected, and when the perivascular spaces are overfilled with fluid they swell. (Arch. f. Psych. u. Nervenkr., II., p. 755.)

One cell has been seen with two processes which split up into fine fibrillæ, which were lost in the surrounding neuroglia. (Fig. 21, *a*, *a*.)

Charcot and Gombault (Arch. de Physiol., t. v., 1873, pp. 143, 304) have described a case of syphilitic disease of the brain and spinal cord, in which these spider cells play an important part. The transformations through which they may pass are described. The nucleus may assume a granular appearance and lose its distinctive character, becoming a mere mass of granules; the cell may undergo fatty transformation, may lose its processes, and finally be represented by a round mass of granules; it has entirely lost its characteristic structure and may disappear. Another change is less clearly explained: "Two hypotheses seem to us admissible; either the tissue has passed through the caseous period and has undergone repair after absorption of the degenerative elements, or the irritation was from the beginning less severe, the morbid process went on more slowly, and the tissue was organized progressively without undergoing fatty degeneration in any part."

The above descriptions apply to the changes which these cells undergo when the disease, affecting chiefly the neuroglia, is of a chronic nature, as in sclerosis. Leyden describes the same increase in size and number as occurring in acute myelitis, but considers that these cells belong more especially to the third stage, that of resorption; he refers their presence and their large size to contraction of the tissues, arising from resorption of degenerated elements causing a dilatation of the nutritive spaces.

Joffroy, Charcot, Hayem, have found these cells in cases of acute myelitis.

A large proportion of the new fibrous tissue in chronic myelitis has its origin from these cells, and it is not unreasonable to suppose, with many authors, that all the newly formed fibrous tissue thus arises from these cells.

Where the nerve structures are chiefly affected, there being little or no increase of the neuroglia, the spider cells do not suffer material change; they have their distinct characteristics, are not increased in number or in size.

OTHER CELLS.

Frommann (Virch. Arch., Bd. 54, p. 42) describes cells which had a finely granular protoplasm, generally with one or two nuclei; these cells filled or partly filled the spaces formerly occupied by nerve fibres. They were occasionally found with the axis cylinders still present, and were then either to one side of the axis or surrounded it. He expresses no opinion as to the nature of these cells.

Leyden (Arch. f. Psych. u. Nervenkr., VI., p. 278) describes, in a case of infantile paralysis, large, pale, round cells, with rather sharp boundaries, clear contents, and clearly defined nuclei. He speaks of them as endothelial structures, their significance not being clear, but thinks that they arise from the neuroglia, by swelling and division of elements. He compares them to the granular cells. He found them also in rents in the cord, in a case of exposure to diminished atmospheric pressure. (Ibid., IX., 1879, p. 316.)

These cells, as he describes them, resemble very closely the nuclei surrounded with protoplasm already described. They differ in that Leyden's cells are said to have a sharp contour. In the gray substance the nuclei are abundant, and it would be expected that they should increase in number in disease.

Kahler and Pick (Arch. f. Psych. u. Nervenkr., X., 1879, p. 186) speak of these cells as occurring in myelitis from compression (fracture). They consider them endothelial cells, arising from the endothelium of the lymph spaces. They give no drawings. Their descriptions are very similar to Leyden's.

NERVE FIBRES.

Both the axis cylinder and the medullary sheath may be affected, or either alone. The earliest change in acute myelitis is swelling. The medullary sheath acquires a diameter three or four times the usual size, and the concentric markings disappear. In the fresh state the medullary sheath is replaced with fatty, granular bodies, which are dissolved in the process of clearing up the section; but there remains frequently a faint appearance of coagulated debris.

Occasionally a perfectly homogeneous, structureless sheath is seen with the axis cylinder in the centre. (Fig. 13.) With polarized light, healthy nerve fibres, on transverse section, show a marking resembling that seen on some kinds of starch. The axis cylinder is dark, and forms the centre of a Greek cross, the quadrants between the arms of the cross appearing bright. Nerve fibres which are enlarged, and have undergone a change in the structure of their myeline, either present no such appearance, or it is irregular and imperfect. This examination is best made in specimens cleared up with oil of cloves, etc.

In cases where the neuroglia is increased, interstitial myelitis, sclerosis, the nerve fibres finally entirely disappear; this occurs, however, only in extreme cases; generally many of the axis cylinders persist; the axis is then closely encircled by the fibrous tissue, is often of less size than normal, and the medullary sheath has completely disappeared (Fig. 13, *a*), having been either absorbed without special change, or more probably having undergone fatty degeneration previous to absorption.

The axis cylinder may be greatly enlarged, sometimes to ten or twelve times the normal size. (Figs. 27, 28.) This is most frequent in acute myelitis. This hypertrophy does not extend over a long tract without interruption; the enlargement is globular or fusiform in shape. The axis cylinder may undergo several such enlargements within a short distance, which gives rise to a varicose appearance. The enlarged axis cylinders, if near together, are so affected as to fit into and overlap each other. (Fig. 28.) Occasionally small vacuoles

are to be seen in the enlarged axis cylinder (Fig. 28, *a'*) ; the significance of this is not known, nor their mode of formation. Many of the axis cylinders have a decided granular appearance ; sometimes this is most marked around the circumference, while the centre is darker, giving an appearance resembling a nucleus.

The myeline is not increased in amount ; at first it forms a thin ring around the axis cylinder ; it undergoes change which ends in its absorption and disappearance. This destruction of the myeline does not always keep pace with that of the axis cylinder ; the latter may entirely disappear, while coagulated masses representing the myeline still remain.

The enlargement of the axis cylinder is found most clearly marked around the periphery of spots whose centres have undergone more extensive changes ; the neuroglia is comparatively unaffected. The final result is the entire destruction of the nervous elements.

The hypertrophy of the axis cylinders was seen seventeen hours after the beginning of the disease, by M. Roth (Virch. Arch., IV., 55, 1872, p. 197), and twenty-four hours after division of the cord by Charcot. (Arch. de Physiol., IV., 1871, p. 93.)

Roth rightly thinks this change to be an active process, an hypertrophy, not merely a secondary change. Joffroy (Mem. de la Soc. de Biol., 1873, p. 77) considers that it partakes of the nature of an irritative process, a parenchymatous inflammation. He says it is never found with fatty degeneration of the nerve fibres ; hence he concludes that tumefaction of the axis cylinders and fatty transformation of the myeline belong to two different processes. This tumefaction, he says, plays no part in ascending or descending secondary changes. Other authors find enlarged axis cylinders in chronic myelitis, as in sclerosis ; but then the change is less extreme. The axis cylinders in both the white and gray substances may be affected.

Softening and final disintegration come from the fatty degeneration and the breaking up of all the tissues. Lockhart Clarke (Med. Chir. Trans., XLVIII., 1865, p. 264) describes the different stages of softening at length, but Leyden (Klinik,

Bd. II., p. 132) gives a much better description of the process. He says, in substance, that the nerve fibres in certain spots have a swollen appearance; by the intrusion of numerous and enlarged granular cells they are pressed apart, are irregularly compressed, are diminished in size, and deprived of their myeline. The medullary sheath becomes dark, muddy, and finally fatty. Fat drops are also scattered about between the nerve fibres. The ganglion cells suffer disintegration and atrophy. The firmness of the connective tissue is decidedly diminished, and there remains a crumbling, brittle, fragmentary mass. The same process may be observed in the gray substance, allowance being made for differences in the normal structure.

Charcot (Arch. de Physiol., III., 1870, p. 247) reports a case of glosso-laryngeal paralysis with atrophy and disappearance of nerve cells in the anterior cornua, but with no diminution in the number of nerve fibres nor increase of nuclei. It is quite unlikely that the nerve cells should be thus affected and the nerve fibres entirely escape; it is more probable that so few nerve fibres were affected that the change was overlooked.

Unless the nerve elements are primarily affected the axis cylinder persists, almost indefinitely; even where the increase of connective tissue is extreme in the white substance, and where the surrounding gray substance is almost ready to break down, the axis cylinders may still be seen. When the nervous elements are chiefly affected, in parenchymatous myelitis, the axis cylinders quickly disappear.

NERVE CELLS.

The nerve cells of the anterior cornua have been most thoroughly studied, and their pathological changes have been most frequently described; those of the posterior cornua have attracted much less attention, indeed, have generally been entirely overlooked.

In chronic diseases the earliest, or one of the earliest, changes in the nerve cell is an increase in the amount of deep yellow pigment; the processes are shortened and soon entirely disappear; at the same time with these changes the

cell diminishes in volume, loses its irregular outline, and becomes globular. The nucleus and nucleolus at first retain their normal size and appearance (Fig. 22, *c*, *d*), or the nucleus may become angular (*a*) and the nucleolus be invisible; finally both nucleus and nucleolus entirely disappear, and there remains a small mass of yellowish granules (*e*, *f*), which are in the end absorbed. The diseased cells may be seen scattered among other healthy cells, or all the cells of one group may be affected; or, sometimes, all those of one anterior cornu.

It must be remembered that the cells vary much in shape and size in different regions, and even in the same region; yet those in the same region closely resemble each other. In judging as to disease of the cells this must be considered; thus, in the anterior cornua, a number of globular cells, with only one or two processes, would show disease; but in Clark's columns this is the normal character of the cells; also in the anterior cornua a fusiform cell with only two processes is seen but rarely, and many of these, especially if small, would show disease; but in the *tractus intermedio lateralis*, and in the posterior columns, this is the more frequent shape, and the prevailing size is small.

In proportion to the atrophy of the nerve cells the nerve fibres also suffer, and when a large number of cells have disappeared there is an evident decrease in the number of nerve fibres.

Sometimes the cells are described as uniformly diminished in size, without other change. It is not likely that this is pathological; the cells vary much in the same person, and especially in different persons, and if there is no change in pigmentation, in processes, nor in nucleus, it is not right to infer disease merely from apparent diminution in size.

Sometimes an increase of interstitial tissue supplies the loss of substance occasioned by destruction of nerve elements; but frequently this loss is not made good, and then the gray substance is distorted in shape. Frequently the cells and nerve fibres are alone affected. The disease must be considered in such cases as primary. Gombault reports such a case. (Arch. de Physiol., 1873, p. 80.)

Charcot and Gombault (Arch. de Physiol., 1875, p. 735) mention a case where the cells of the anterior cornua were atrophied while the cornua retained nearly their normal dimensions because of the "truly enormous development which the capillary circulation of that region has received."

In those instances where the cells seem chiefly affected Charcot thinks that they are the primary seat of the lesion.

In acute myelitis the nerve cells are first swollen; they are also found swollen in some cases not acute when the surrounding tissue is also affected. Pierret (Arch. de Phys., 1874, p. 968) found swollen cells in animals with myelitis produced experimentally. The nucleus may be excentric, quite near the periphery.

Fatty degeneration is occasonally found, less frequently, perhaps, than in the nerve cells of the brain. (See Magnan, Compt. Rend de la Soc. de Biol., 1869, p. 113.)

Jolly, quoted by Leyden, and Leyden (Klinik. Bd. 1) regard nerve cells with two nuclei as pathological, but no other author mentions this.

A vitreous change of the ganglion cells is found with partial loss of their processes; in some the vitreous change invades the processes also. These cells are normal in size, or they may be hypertrophied; they have little or no pigment, and sometimes contain cavities. (Hayem, Frommann, Aufrecht, Leyden.)

Cavities, or vacuoles as they have been called, are found within cells either singly or in groups. Kahler and Pick have seen twenty-five in one cell. The septa may break down whereby a large cavity is formed from two or more smaller cavities. Edes (Boston Med. and Surg. Jour., July 24, 1879) reports a case where the cavities encroached upon the processes and caused an enlargement of the cell. Dejerine (Arch. de Phys., 1876) found vacuoles in a case of muscular atrophy and paraplegia.

COMMISSURES AND CENTRAL CANAL.

Changes found in and around the central canal are considered important by some authors. They may indeed give rise to symptoms, but there are usually other changes, and it

is impossible to decide to which the symptoms are due. (Hallopeau, Michaud, A. Eickholt.)

The central canal varies much in size even in health. It may be greatly dilated, as in cerebro-spinal meningitis and in some cases of myelitis and sclerosis. In myelitis the canal is the more frequently obliterated by an increase of nuclei or cells which gradually crowd the epithelial lining into the canal; then the epithelial cells give place to merely nuclear elements, or to very small cells with large nuclei and scarcely any protoplasm. The nuclei may extend laterally and antero-posteriorly, so as almost completely to destroy the anterior and posterior commissures. As the large vessels on either side of the central canal are more or less implicated in this mass of new-formed nuclei the nutrition of the cord in such cases is probably disturbed.

When the canal is not obliterated it may be distorted in shape, and become angular or divided, so as to form a double canal, from the irregular growth of the nuclei. The canal may be filled with a fluid which hardens under the influence of reagents and takes a deep red color from carmine. A similar exudation is sometimes found in other parts of the cord in cases of myelitis. Some authors call this exudation colloid. (Hayem.)

Changes in the commissures are independent of the condition of the neighboring white substance. Where the nerve fibres were destroyed close up to the commissures there was in some sections no material increase of nuclei, only a moderate multiplication of the epithelium. In another section there were also fibres crossing between the epithelial cells in an obliquely antero-posterior direction. A similar change is described by Hallopeau (Mem. de la Soc. de Biol., 1869, p. 168) in a case of *sclérose diffuse periépendimaire.*

The relation which an increase of nuclei in the commissures bears to morbid processes is not yet well determined. In myelitis, with extensive destruction of the nerve elements, there may be little or no increase of nuclei in the commissures. The same is true in regard to sclerosis where the white substance close to the commissures is affected. On the other hand, the nuclei may be greatly multiplied, the central

canal entirely occluded, and yet no characteristic symptoms be recognized. It would seem that some other influence than inflammation is required to originate such changes. What that influence is, and what are the symptoms, if any, attending this change, we have yet to learn.

Michaud describes the mode of origin of the masses of nuclei. They are arranged in small groups or in lines, like the beads of a rosary (Fig. 23), which have a transverse direction. He says that the obliteration of the central canal is unimportant; more significance belongs to the multiplication of nuclei in the gray commissure at a distance from the central canal. He thinks there is no cell membrane enclosing these nuclei. I have not seen a cell membrane, but on teasing apart the nuclei they are seen to be surrounded by a small amount of granular protoplasm.

GRANULAR CORPUSCLES.

Granular corpuscles or granular cells are found in the spinal cord in various affections; there are almost as many opinions in regard to their origin and significance as there are authors. In the last few years this has been debatable ground in the pathology of the spinal cord. Meyer, Roger and Damaschino, Virchow, Jastrowitz, Huguenin, Hayem, Westphal, Adler, Leyden, Obermeier, Moxon, Simon, Eisenlohr, have all discussed the origin and significance of these bodies, some taking one view and some another; their origin has been referred to the nuclei of the blood vessels or the adventitia, to the connective tissue independently of the vessels, to Deiters' cells, to the cells or nuclei of the neuroglia, or to the nerve elements.

The presence of a few granular corpuscles seems to have no pathological significance. Jastrowitz (Arch. f. Psych. u. Nervenkr., II, III) finds them as normal products in both the brain and spinal cord of the fœtus; with the full development of the nervous centres they gradually disappear. Leyden says they are no longer to be considered as characteristic of inflammation. Mayer comes to the conclusion that general weakness of the system and emaciation is a cause of the fatty degeneration of the spinal

vessels, and says that the granular cells may just as well be the residuum of general disturbance of nutrition of the organism as of a fixed local inflammation. He, however, recognizes that these bodies may exert an injurious influence upon the nervous tissue if they are present in excessive numbers.

In all these discussions the question seems to have had reference to the presence of a few granular corpuscles; that they do not necessarily prove the presence of inflammation. If these bodies are found in large numbers crowded together and obscuring the view of other parts it would not be denied that they are an important pathological product, whether it is a process of degeneration or a chronic inflammation which has given rise to the product.

It seems, then, that granular corpuscles may arise from degeneration or fatty change of the nuclei of vessels, or of the nuclei and cells of the neuroglia. Some authors think that the myeline or the axis cylinder of nerve fibres may also give rise to them. That they may arise from the nuclei of vessels is easily shown by teasing or brushing out the vessels so as to free them from surrounding tissues. It is generally admitted that they may arise from the nuclei and cells of the neuroglia.

Observers differ in opinion as to whether granular corpuscles are formed from the medullary sheath and axis cylinder of the nerve fibres. They probably do originate from the medullary sheath. I have never seen any appearance indicating that they arose from the axis cylinders.

Not much can be added to what has been said by others as to the significance of the presence of these bodies. Leyden (Berl. kl. Wochensch., No. 9, 1878) said, at a meeting of the Berlin Medical Society, that it is always difficult to understand how the granular cells arise; he considers the process is an acute or sub-acute inflammation, which may pass into sclerosis. Westphal, at the same meeting, said in reply to Leyden, that he considered the granular cells to belong to a degenerative process, which is certainly not acute, but chronic.

It is scarcely correct to say that the inflammation may pass

into sclerosis. The formation of these bodies is one of the changes found in every case of sclerosis, and the fact that they thus occur in large numbers, while the cellular elements are also found in large numbers, is one proof that they probably arise from the nerve fibres.

After hardening by the use of both bichromate of potassa and alcohol, a crystalline change sometimes takes place in the granular corpuscles, which causes them to act on polarized light.

These bodies are much less numerous in the gray substance than in the white.

AMYLOID BODIES.

Amyloid bodies are found in both the gray and white substances, grouped about vessels and in the cortical layer. They occur in numerous pathological conditions, sometimes in large numbers. Their mode of development, excepting that probably they do not arise from the nerve fibres, but from the nuclei of the vessels or of the connective tissue, and their significance, are not well known. They cannot exert much influence upon the nerve tissue by pressure.

VESSELS.

The vessels are generally altered in every pathological process. One of the most common changes in chronic cases is a thickening of the walls. This thickening is usually confined to the external coat. Only occasionally is the muscular layer affected. At times there is an increase of the nuclei, and sometimes a great distortion of the vessel, because of the irregular distribution of the changes.

The nuclei of the perivascular sheath may be greatly multiplied, so as to obscure the vessel. Sometimes the structures around the vessels are separated from it by a vacant space; either the vessel has collapsed, or the hardening has caused the surrounding tissues to shrink away from the vessel.

There may be fatty degeneration of the elements of the vessel; the nuclei may undergo this change and give rise to granular cells, or the other elements may suffer and drops of

fat may be scattered over the walls of the vessel (Fig. 25), or the muscular layer may undergo a fatty degeneration.

In acute processes there is less likely to be a thickening of the walls; multiplication of nuclei is more frequent, and an exudation around the vessels is not uncommon. This exudation has been frequently described, and from some observers has received the name colloid. It is strongly tinted by carmine, seems to force its way between the nerve fibres, and probably contributes to their destruction. This exudation is very different from that found in certain chronic changes, which is confined within the sheaths of the vessels and is not tinted by carmine. This colloid exudation is found most frequently in and near the commissures.

In acute or sub-acute processes, the blood-vessels may be greatly dilated, and, perhaps, increased in number, or the smallest vessels become more prominent. Their walls then are usually not thickened. Yellow granules may be found around the vessels, and white blood corpuscles or leucocytes may be found outside the vessels.

CAVITIES.

The cavities found in the spinal cord may originate in two ways: either the central canal is dilated, though this seldom occurs, or the cavity is formed *de novo*, at the expense of the gray or white substance just posterior to the central canal. Th. Simon (Arch. f. Psych. u. Nervenkr., v., 1874, p. 120) has given a very full review of all the cases previously reported. Simple dilatation of the central canal was found in only very few cases. More commonly a compressed central canal could be seen in front of the cavity.

He says the walls of the cavities are formed by a tissue composed of fine fibres, in which are embedded numerous round cells, which contain very large nuclei, and only a small amount of protoplasm. Two of his cases, he thinks, are specimens of tumor, with a central cavity formed by softening and disintegration of the proper tissue of the tumor.

Leyden considers that in such cases there is not only an inflammatory process, but that there is a true, new formation, of the nature of a *glio*-sarcoma.

Wladimir Roth (Arch. de Physiol., 1878, p. 612) also looks on the new-formed tissue as a glioma. Friedrich Schultze (Arch. f. Psych. u. Nervenkr., VIII., 1878, p. 367) reports a somewhat similar case, in which the new growth had the characteristics of a round-cell sarcoma.

August Eickholt (Arch. f. Psych. u. Nervenkr., X., 1880, p. 613) reports a case in which the central canal was itself enlarged, and its walls were very much thickened with an increase of cells and fibres, closely resembling the glioma.

Adolf Strümpell (Arch. f. Psych. u. Nervenkr., X., 1880, p. 695) reports a case in which there was a large central cavity, .07 ctm. long, .03 ctm. wide, which was simply the dilated central canal.

It has been my fortune to examine a cord containing a large cavity confined chiefly to the posterior columns. The central canal, still of considerable size, but rather distorted, lay anteriorly, separated from the cavity by the gray commissure. The walls of the cavity had collapsed when its contents had escaped, and were partially covered with the granular remains of the coagulated fluid. The walls were formed of fibres and cells. The fibres were broad and coarse, several times thicker than the normal neuroglia fibres. Near the cavity these fibres were interspersed with cells, forming a narrow and firm lining membrane; externally the fibres were more loosely woven together, with fewer cells and many granular corpuscles. The cells were either round, containing little protoplasm, with a large round nucleus, or they were fusiform, with an oval, sometimes round, nucleus. These fusiform cells gave rise to fibres exactly resembling the fibres interwoven among the cells. Both cells and fibres were deeply tinted by carmine.

CONCLUSION.

It will be interesting to briefly notice the manner in which these changes are combined to produce various forms of disease. Some authors consider that all inflammations of the spinal cord are interstitial. (Fox, C. Lange.) This is not strictly true.

ACUTE MYELITIS.

Acute inflammation, ending in softening, generally affects all the elements of the cord, and its structure is soon so changed that it is impossible to recognize the two forms of inflammation. The final stage is softening, the cord breaking down into a fluid or semi-fluid pulp. The changes in the nerve fibres which lead to softening have been already considered (page 15). In the neuroglia there is first a swelling of the fibres and of the cellular elements, then fatty degeneration of the latter; the fibres become brittle, granular corpuscles are formed, and these, with the other elements, are finally resolved into a granular, fatty, semi-fluid débris. At the commencement of this process the nerve fibres and cells suffer in their nutrition, and are finally destroyed; but the earliest change is in the neuroglia.

The blood-vessels may be first affected; then the changes in the nervous tissues and neuroglia are secondary, and partake more of the character of necrosis than of inflammation. It may be very difficult to decide which change is primary or which secondary. Occasionally the diseased blood-vessels rupture. Sometimes pus is found mingled with other products of inflammatory softening. Sometimes pus is found in the larger septa, having penetrated from the periphery in case of meningo-myelitis.

In most cases of acute softening, the interstitial tissue is probably first affected, the nerve fibres in these cases being destroyed secondarily; yet the destruction of these nerve fibres depends so intimately upon the disease of the neuroglia, and follows that so closely it is almost synchronous therewith.

In acute parenchymatous myelitis the progress is less rapid than in acute softening from interstitial myelitis; the disease invades successively one zone after another, advancing more rapidly longitudinally than transversely. In these cases the changes are such as to show an irritation or inflammation of the proper nervous elements; the nerve fibres are enlarged, axis cylinders hypertrophied; the fibres break up into fat and granular corpuscles, and

the nervous elements disappear before the neuroglia is seriously affected. In such a case the cord retains its consistency, is not much if at all softened; it may be rather more yellow than normal on section.

It seems now to be generally admitted that in infantile paralysis and allied affections in the adult the nerve cells are primarily affected, other changes being secondary. It is interesting in connection with the affection of nerve cells alone, that Eichorst (Virch. Arch., LXIV., 1875, p. 425) states that in fœtal life the anterior cornua are very rich in blood-vessels, and these are so distributed that each nerve cell is surrounded by a net-work of vessels.

In Gombault's case of paralysis in the adult (Arch. de Physiol., v., 1873, p. 80) the nerve cells alone were affected, the white substance was healthy, there was no increase of nuclei in the gray substance, and the vessels were healthy.

CHRONIC MYELITIS.

CHRONIC INTERSTITIAL MYELITIS.

In this form of myelitis, which is usually called sclerosis, the nuclei are increased in number, the spider cells become larger, are more easily recognized, and probably are more numerous; the walls of the blood-vessels are thickened, the nuclei in the perivascular sheath or the adventitia may be multiplied; the fibres of the interstitial tissue become more numerous. Either from compression or from direct interference of their nutritive supply the medullary sheath of the nerve fibre disappears; the axis cylinder may become enlarged but not to such an extent as is seen in acute myelitis. The medullary sheath may simply disappear, or it may break up into bodies resembling granular corpuscles. It has been said that the swelling of the axis cylinder is the first stage of its disintegration and that it then changes into granular corpuscles; but it seems more probable that the axis cylinder simply suffers atrophy and finally disappears. Many, however, persist indefinitely after their medullary sheaths are gone. After hardening and preparing with turpentine, etc., the

transverse section of the cord often shows small cavities (Fig. 24, *o*) not filled with fibres nor cells, not containing axis cylinders, either empty or filled with an indistinct granular mass, which seems to be the remains of granular corpuscles. In some cases these cavities lie near together, but are almost always separated by a narrow septum of interstitial tissue; sometimes they are scattered singly over the field. Their origin is rather uncertain; apparently they have been filled with granular corpuscles, the product of disintegration of tissue.

As the fibrous septa are distributed variously in the different regions of the cord, the manner in which the enlarged, thickened septa seem to force their way between and among the nerve fibres, in the earlier stages of the process, must vary in different regions. In the anterior columns the septa run a course from the periphery to the centre, nearly parallel one with another, anastomosing with each other by short and thin processes; in these columns the inflammatory thickening of these processes gives to the sclerosis in its first stage a radiating appearance. In the lateral columns the septa are less regular, they interlace in a more intricate net-work, which is rather coarse near the central gray substance. In these columns sclerosis, in its earlier stage, gives a coarsely reticulated appearance to the altered tissues. In the posterior columns the septa are more finely reticulated in the columns of Goll, rather coarsely reticulated in the external radical columns. Sclerosis follows this arrangement and in the central parts of the posterior columns the change is more irregularly distributed in the first stage than in any other part. The inflammatory proliferation of fibres can sometimes be seen to arise from several separate points, where are the enlarged and prominent spider cells.

These variations in structure, as explaining the progress of the disease in different regions, will also explain the grouping of the nerve fibres which are comparatively intact. In the anterior columns they are in chains or rows of three or four or more, radiating towards the periphery, in the lateral columns in smaller groups; but everywhere it is evident that

the cause of such aggregation is the normal distribution of the septa.

In the formed chronic interstitial myelitis, sclerosis, there is seen a tissue composed of extremely fine fibres interwoven closely around nuclei, spider cells, axis cylinders, and the cavities mentioned above, which may in freshly prepared specimens, and especially with a low power, seem to be merely a mass of granular substance enclosing vessels with thickened walls.

After a while, if the patient lives, the granular corpuscles may be nearly or quite absorbed, so that they may not be as numerous in one section as in another, or as in another case.

Corpora amylacea are found scattered over the diseased tracts, and in their vicinity, in varying numbers.

Chronic interstitial myelitis may affect the gray substance as well as the white. Then there is an increase of nuclei, the spider cells become more prominent, and probably are also increased in number. As in the white substance the axis cylinders persist, and the neuroglia cells become more prominent, and probably are also increased in number; the nerve cells seem at first to be but little affected; they retain their form and size, excepting, perhaps, towards the very last stage of the disease.

CHRONIC PARENCHYMATOUS MYELITIS.

In this form of myelitis, which is familiar to us as the lesion found in locomotor ataxia, and perhaps in symmetrical lateral sclerosis, the elements of the interstitial tissue are increased, but less than in interstitial myelitis. The nerve fibres which persist in a nearly healthy condition are found not only near the borders of the disease, but scattered singly or in small groups over the affected spot, unless the change is far advanced. The persisting fibres are generally smaller than normal, the axis cylinders most frequently disappear with the medullary sheaths. Charcot says they are wanting, but I think that I have seen them after the medullary sheath has disappeared; they are, however, soon absorbed. The nerve fibres being primarily and most seriously affected, it is reasonable to follow Charcot in calling this parenchymatous

myelitis. It is interesting to notice in this connection that true muscular atrophy, depending upon lesion of the cells of the anterior cornua, a parenchymatous change, is found much more frequently in these cases than in the so-called sclerosis, the chronic interstitial myelitis.

Leyden (Arch. f. Psych. u. Nervenk., x., 1880, p. 641) says, in regard to a case of amyatrophic bulbar-paralysis and symmetrical lateral sclerosis, "hence we come to the conviction that we have to do with a chronic parenchymatous degenerative process advancing in the nervous elements in the course of those fibres having the same functions, in which the changes in the neuroglia play a subordinate part, and are developed only secondarily."

Schultz (Deut. Arch. f. kl. Med., xxiii., 1879, p. 343) thinks that the existence of a primary sclerosis of the lateral columns is not yet established.

In sclerosis the boundary between diseased and healthy tissue is not a well-defined line; the trabeculae of connective tissue thicken and gradually push their way in between the nerve fibres; in these thickened septa the nuclei and cells are increased; the transition is gradual, but even in small spots of sclerosis and in places where it is seemingly of recent formation, there is a limit beyond which there are no nerve fibres, only axis cylinders. In ataxia the disease shows no marked boundary line, the healthy and diseased portions shade off into each other, but in rather a different way. The nerve fibres diminish in number, and the interstitial substance increases, but the latter does not push out into the healthy districts, widening and thickening as in sclerosis. Groups of nerve fibres vanish, others remain; where the disease is more advanced those groups are composed of a smaller number, or there may be only single nerve fibres scattered over the field. Not until the disease is far advanced, and has invaded nearly the whole of the posterior columns, is there seen the total loss of medullated nerve fibres which is observed at a comparatively early period in sclerosis. That this difference does not depend upon the anatomical structure of the posterior columns is shown by the fact that when sclerosis passes over from the lateral to the posterior columns, the degeneration of

the nerve fibres follows the same rule as when the sclerosis is confined to the antero-lateral columns.

Again, in sclerosis the axis cylinder persists for a long time. In ataxia the axis cylinder disappears much earlier in the disease.

In ataxia the blood-vessels are occasionally covered with nuclei, but to a less general extent than is found in sclerosis.

In ataxia there is more generally hyaline thickening of the walls of the vessels, without increase of nuclei.

As to the nature of this process, Leyden (Klinik., IX., p. 330) says, that it seems most probable that atrophy of the nerve fibres is the starting-point of the process; "that, according to Charcot's expression, it is a parenchymatous sclerosis."

Adamkiewicz (Arch. f. Psych. u. Nervenk., X., 1880, p. 772) reports a case in which were some of the symptoms of ataxia; the lesions he thought were primarily interstitial. From this he concludes "that tabes is a chronic degeneration of the connective tissue." Yet the changes he describes are quite different from those usually seen in locomotor ataxia, — so different that no conclusion can be drawn from his case justifying the above view.

Strümpel (Arch. f. Psych. u. Nervenk., XI., 1880, p. 27) carefully analyzes three cases, two of lateral sclerosis (degeneration of pyramidal columns), also degeneration of the posterior columns, and one a case of more decidedly tabetic character. He concludes that these cases must be considered as cases of parenchymatous degeneration. His paper is well worth reading.

Some authors have considered that granular corpuscles are rare or are absent in ataxia. They are rare in the older parts, but present and numerous in the more recent parts, of the disease.

The distribution of chronic interstitial myelitis in patches, scattered here and there irregularly through the cord, is explained by the fact, that in the interstitial tissues new centres of origin give rise to local extension of the disease; as the connective tissue extends irregularly without bearing any direct relation to the development or functional grouping of

the nerve fibres, the spots of disease extend irregularly, and hence may invade any or all the white columns, and encroach upon the gray substance.

In chronic parenchymatous myelitis, the nerve fibres being at first chiefly affected, the disease extends in the direction of the nerve fibres, and affects one and the same bundle of fibres over a relatively long tract; thus, in one case, the external radical columns were affected in the lumbar, dorsal, and cervical regions; in only a portion of this extent were the columns of Goll involved.

In progressive muscular atrophy the nerve cells are chiefly or exclusively affected, the interstitial tissue escaping. The nerve cells pass through the changes already described. In many of these cases there is, however, finally, some change of neuroglia.

There may be, then: —

1. *Acute interstitial myelitis*, with swelling of the fibres, nuclei, and cells of the neuroglia, with destruction of nerve fibres and nerve cells, leading to softening.

2. *Acute parenchymatous myelitis*, where the nerve fibres in the white substance are primarily or chiefly affected, myeline and axis cylinders both disappearing, but the interstitial tissue remaining, seemingly not much changed; also cases in which the nerve cells are chiefly affected, especially those of the anterior cornua, the nuclei and cells of the neuroglia being almost entirely exempt from change, as in infantile paralysis and allied affections.

3. *Chronic interstitial myelitis*, affecting the neuroglia, fibres, nuclei, and cells in both white and gray substance, the nerve fibres and cells being affected only secondarily, as in sclerosis.

4. *Chronic parenchymatous myelitis* — in the white columns only locomotor ataxia, or lesion of the posterior columns (and secondary ascending and descending degeneration possibly), is as yet well known; lateral sclerosis probably belongs to this variety. In the gray substance the cells are affected as in progressive muscular atrophy.

There is as much reason to thus subdivide myelitis as there is to divide nephritis into the interstitial and parenchymatous forms.

EXPLANATION OF PLATES.

Plate I. — Healthy Structure.[1]

Figure 1. Portion of anterior column, near cortex, healthy. *a*, cortical layer. *b*, trabecula entering the cord, dividing. *d*, nerve fibres, axis cylinders in centre. Small nuclei, *c*, are seen, especially in the trabecula.

Fig. 2. Spider cells teased out, from posterior column near the commissure.

Fig. 3. Longitudinal section, showing nerve fibres, some running at an angle to the others; neuroglia fibres running parallel with nerve fibres, or a few transversely; nuclei scattered over the section. *a'*, medullary sheath showing around axis.

Fig. 4. Transverse section through posterior column near commissure, dorsal region, showing the grouping of nerve fibres and spider cells. *c*, spider cell with two fibres from nucleolus. *v*, a small vessel.

Fig. 5. Nerve cell from anterior cornu, healthy, fibres passing from a subnucleolus through the nucleolus and nucleus into the body of the cell (10 immersion).

Fig. 6. Nerve cell from posterior cornu, healthy, shorter fibres from nucleus.

Figs. 7, 8. Nerve cells, healthy, from Clarke's columns.

Figs. 9, 10. Small fusiform cell from posterior cornu.

Fig. 11. Epithelium lining central canal from fœtus at term. Fibres running into commissure are seen.

Fig. 12. A small vessel with perivascular sheath.

Plate II., III. — Pathological.

Fig. 13. First stage of chronic interstitial myelitis (sclerosis). *a a*, axis cylinders without myeline. *n*, a group of nuclei of the neuroglia, which are granular. These nuclei are much more numerous than in health. *b*, *c*, nerve fibres with myeline coagulated around the axis cylinders, without concentric markings. *f*, nerve fibre nearly or quite healthy. *e*, fibrous septum.

Fig. 14. Nuclei from sclerosis; *a*, with protoplasm, but no cell wall; *b*, without protoplasm.

Fig. 15. A group of spider cells from a case of sclerosis. The granular matter and fibrous tissue is omitted; *c*, axis cylinders; *a*, large spider cell with numerous processes and two nuclei; *b*, spider cell without nucleus.

Fig. 16. Fusiform neuroglia cells with processes radiating from both ends. One has two distinct nucleoli (10 immersion).

Fig. 17. Enlarged, or swollen spider cell from gray substance in a case of syphilitic disease.

Fig. 18. Spider cell with a group of five nuclei.

Fig. 19. Nuclei and axis cylinders in a case of advanced sclerosis; *a*, small spider cells as if partially atrophied.

Fig. 20. Sclerosis; *v*, vessel with perivascular sheath distended with coagulated material and connected with a spider cell, *s*, by a process which seemed to have a double wall; this cell has another process which divides, sending one branch towards the vessel; *a*, axis cylinders; *n*, nuclei.

Fig. 21. Spider cell with two processes, *a*, *a*, which split up into fibrilæ (magnified 900 diam.).

Fig. 22. Nerve cells in different stages of atrophy; *a*, *b*, *c*, *d*, from one specimen; *e*, *f*, from another.

Fig. 23. Commissure a short distance laterally from the central canal; multiplication of nuclei in its first stage, seen best at *b*; *a*, fusiform cells connected with fibres; one at *a'*, has two nucleoli.

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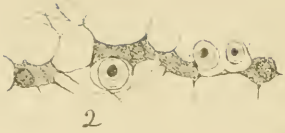
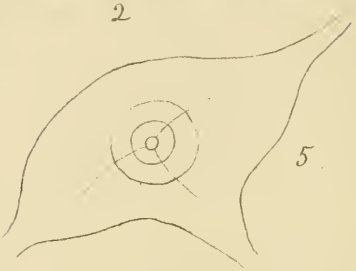
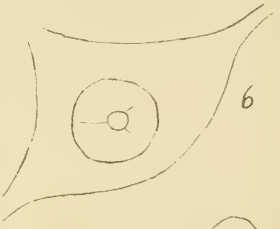
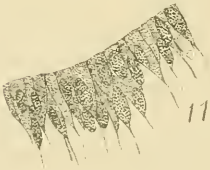
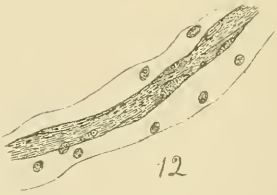
[1] Figs. 5, 16, 21, are more highly magnified, 25, 26, 27, 28, less highly, than the others.

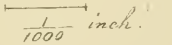












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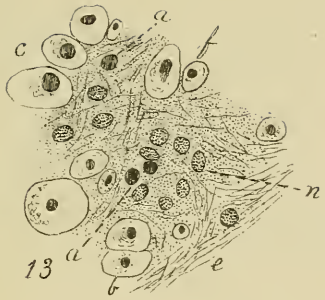

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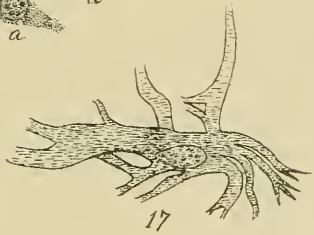

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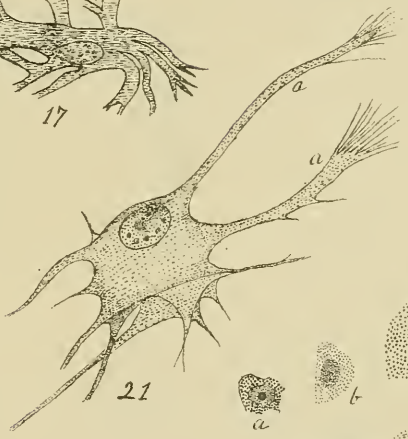

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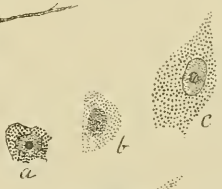

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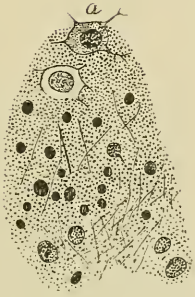

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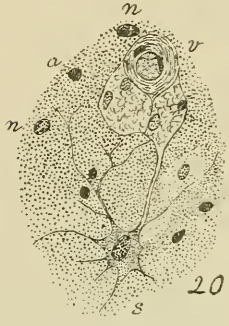

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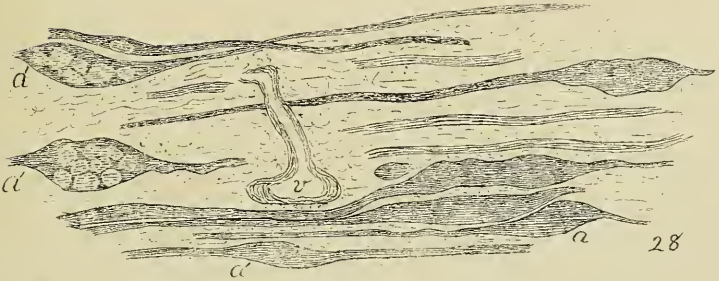

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FIG. 24. Sclerosis; *c*, *c*, *c'*, spider cells; *c'*, is connected with the vessel, *v*. There are many small cavities, as at *o*, which, in the fresh state, are filled with granular corpuscles, and as prepared show faint traces of coagulated contents.

FIG. 25. A vessel rather thickly covered with fat globules, from a case of cerebro-spinal meningitis.

FIG. 26. Vessels in sclerosis, transverse section, showing exudation into the perivascular sheath, a moderate thickening of the walls in two of the vessels. A very low power.

FIG. 27. A, transverse section of cord in acute myelitis, showing enlargement of many axis cylinders. B, section of healthy nerve fibres from the same cord at another level. Both these are from the posterior columns. Low power.

FIG. 28. Longitudinal section in acute myelitis, showing hypertrophied axis cylinders. At *a*, showing how they are grouped, overlapping each other; *a'*, *a'* axis cylinders, hypertrophied, containing vacuoles; *v*, vessel. Low power.

NOTES OF TYPHOID FEVER.

By C. Ellery Stedman, M.D.

In the first volume of the City Hospital Reports, Dr. J. B. Upham tabulated the cases of Typhoid and Typhus Fevers treated in the Hospital from its opening in 1864 to 1870. This article, which is not meant for a treatise on Fever, partly continues the subject, and the writer adds a few practical observations.

The Medical Records have been examined for this purpose by Dr. C. G. Weld, House Physician in 1880, without whose obliging assistance and careful research this paper could not have been compiled.

The record comprises the cases of Typhoid Fever entered on the books between 1st January, 1871, and 1st January, 1881, excluding those admitted before the latter date, who still remained in the hospital.

There were admitted		1,036	
Of whom died		186	
A percentage of mortality			$17\frac{9}{10}$
Dr. Upham's cases	152		
Of whom died	21		
Percentage of mortality			$13\frac{8}{10}$
Total number of cases in 15 years	1,188		
Deaths		207	
Percentage			$17\frac{3}{10}$
In the last ten years there were admitted moribund (dying within 48 hours)			28
In Dr. Upham's series of cases			4
Total			32
Which number subtracted from the number of deaths leaves			175
Or a percentage of mortality in 1,088 cases of			16

In Dr. Murchison's tables of the London Fever Hospital the percentage of deaths ranges in different years from $13\frac{63}{100}$ to $28\frac{42}{100}$. In fifteen hospitals he quotes proportions of deaths from $11\frac{37}{100}$ (Dundee Royal Infirmary, 1857 to 1870) to 32 per cent. (Paris, Chomel, 1834.) In his collection of 18,000 cases the mortality is $18\frac{62}{100}$ per cent. Chambers records a mortality of $2\frac{1}{2}$ per cent. in 121 cases; the Massachusetts General Hospital, 13 per cent. in 303 cases; Flint, 24 per cent. in 73 cases. Bordier gives the average mortality in Paris hospitals as ranging from 5 to 9 per cent. Such are the wide variations of the fatality of this disease given by different observers in various places at different seasons. In this series of patients the deaths numbered from 12 per cent. in 1872, when 156 were admitted, to over 21 per cent. in 1879, when there were only 70 cases. — Since this paper was written I am informed that the death-rate in the hospital from Typhoid Fever, in 1881, was 10 per cent.

The COMPLICATIONS of different diseases and lesions with this fever are recorded below.

	Cases.	Died.		Cases.	Died.
Pneumonia	45	14	Phlegmasia	9	. .
" and Abortion	1	. .	" and Abortion	1	. .
" and Lymphangitis	2	. .	Perforation (autopsy)	1	1
" and Nephritis	2	2	Peritonitis	6	3
" Otitis	10	1	" and Tuberculosis	1	1
" " and Nephritis	1	1	Pregnancy	1	. .
" and Cardiac dis.	1	. .	Perityphlitis	1	1
Pulmonary Embolism	1	1	Orchitis	1	. .
Empyema	1	. .	Abscess, Alveolar	1	. .
Pleurisy, with effusion	1	. .	" Pulmonary	1	. .
Pneumothorax	1	. .	Abscess, Rectal	1	. .
Gangrene of Lung	1	1	Pericarditis	1	1
Otitis	22	1	Pelvic Cellulitis	7	. .
" and Cerebral Embolism	1	1	" " and Pneumonia	1	. .
Parotitis	2	1	Erysipelas	8	2
" and Nephritis	1	. .	Synovitis	2	. .

	Cases.	Died.		Cases.	Died.
Cardiac lesions	2	..	Rheumatism	2	..
Syphilis	1	..	" acute and Nephritis	1	..
Bubo	1	1	Nephritis acute and Purpura	5	2
Hemorrhage, intestinal	25	14	Ophthalmia	2	..
" uterine	1	1	Rubeola	1	..
" aural	1	1	Nephritis, acute	6	3
" gastric	3	3	" chronic and Jaundice	1	1
Alcoholism	1	1	Tape-worm	1	..
Tonsillitis	8	2	Abortion	1	..
Inflammation of Gall Bladder	3	2	Phthisis	15	2

There are entries in the Records of "Typhoid Pneumonia," which are not included in the above list, unless the symptoms recorded warranted a diagnosis of enteric fever. It will be noted that beside the 45 complications with simple *pneumonia*, causing a mortality of $31\frac{5}{10}$ per cent., there were 18 with pneumonia and other lesions, and that the death-rate of all was $28\frac{5}{10}$ per cent. The 17 complications with *Nephritis* give a mortality of $47\frac{9}{10}$ per cent. 30 cases of *Hemorrhage* are seen above (a trace of blood in the dejections, and epistaxis not being reckoned), all of them having been fatal except those from the intestine, and of these 56 per cent. died. Purpuric spots have a bad significance, as the tendency is to intestinal hemorrhage; two such cases are included. One woman died after copious uterine hemorrhage, perhaps an abortion. One of the cases of "Tonsillitis" was probably diphtheria, and an autopsy, if permitted, might have shown necrosis of the larynx. "*Phthisis*" is named as a complication in 15 cases, because the minutes of physical examination seemed to demand such a diagnosis. Doubtless several of these cases of Typhoid Fever were tuberculosis, named under the former heading because a diagnosis was demanded for the Superintendent's monthly report before due observations were completed.

Rose-spots are specified in	.	438, or $42\frac{8}{10}$ per cent.
" Dr. Upham's tables	.	94
Total	.	532

or in $44\frac{7}{10}$ per cent. of 1,188 cases.

A number (not counted) of these had *tâches bleuâtres* mingled with the rose-spots, while other fever patients had the blue stains alone. These maculæ are more apt to occur in mild cases; but they were seen on the abdomen of at least one patient who died.

Diarrhœa was observed in	.	540, or $52\frac{1}{10}$ per cent.
" " Dr. Upham's,		48
or $49\frac{2}{10}$ per cent.		588

There were admitted 12 patients over 50 years old, with fever, of whom 4 died; one was 60 years old. [See Case 22.]

116 deaths appear to have happened without known complications, 5 such having been verified by autopsy.

There are reported in ten years 270 cases of "Febricula," and a few of "Continued Fever." The latter would now, probably, be classed as Typhoid, and it is likely that enough cases of Febricula, if proper histories could be obtained, would prove Typhoid, to influence the proportion of mortality. The study of what we call "Febricula" in relation to the possibility of aborted Typhoid, is interesting, but baffled by the fortunate lack of autopsies in the former class.

The scarcity of autopsies at the City Hospital is accounted for by the fact that the written consent of friends is required for the performance of the operation. All the cases completed by the record of autopsies for ten years, are given below: —

(1.) LXIX, 191. *Fever after Bubo, fatal on 14th day. Congestion of Lungs; Ulceration of Peyer's Patches.* — Aaron R., admitted Aug. 19, 1871, from a surgical ward, which he entered (7th) for treatment of a bubo of three months. On the 8th he had nausea, headache, and epistaxis.

— 16th, tinnitus; had felt poorly for weeks. Is now rational; tremor of hands and arms; weak; face flushed; countenance stupid; skin hot and dry; twelve dejections, ochrish; tenesmus; micturition free; anorexia; tongue glazed; epistaxis several times; tympany and tenderness; questionable rose spots; pulse 120, feeble. Heart normal; sonorous râles anteriorly, mucous and sub-mucous posteriorly on both sides. — P.M. Pulse, 112; respirations, 36; temperature, 104.2°. — 12th day of disease. Sordes; tongue glazed, dry and hard; hands tremulous; face congested; cough; rusty, adhesive sputa; breathing labored; rational now; one dejection; bubo smelling foully; has had delirium; three dejections; pulse, 132. — Evening. Pulse, 160; respirations, 44; temperature, 103.2°. Speech difficult; dyspnœa; crepitant râle below right nipple, occasional sonorous râles throughout front of the chest, with puerile respiration; the left half of the chest dull. — 14th. Died at 9.15 A.M.

Autopsy showed marked congestion of posterior portion of lobes of both lungs, and many ulcerations, some of large size, in the lower portions of the small intestines.

(2.) LXXI, 48. *Fever; Ulceration of Gall-bladder. Death on the 24th day. Autopsy.* — Ella Jane H., aged 13, admitted September 19, 1871, with father, mother, and four brothers and sisters, from wet, unwholesome hovels, condemned by the Board of Health. All recovered but Ella Jane and Laura Etta, whose records are here copied: —

Ella Jane, four weeks ago, headache; backache; tinnitus; diarrhœa. Took to her bed two days ago from cramps caused by baked beans, which pains have continued; cough began the same day; tender abdomen; rapid emaciation. On entrance, pinched and pale; eyes sunken; skin warm; abdomen dusky, tympanitic, distended, its superficial veins swollen. Hacking cough. Lies on back; knees drawn up, but she can extend them. — September 21st. Diarrhœa less; abdomen not so tender; no cramps. — September 22d. Died.

Autopsy in six hours, by Dr. Webber. . . . Ab-

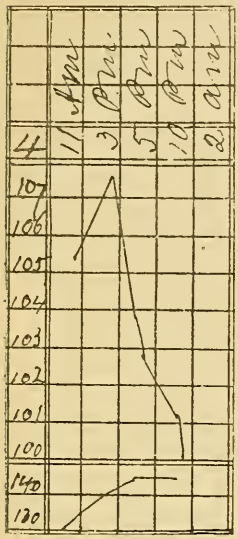
domen holds a pint and a half of yellowish serum, with much lymph; liver large, fatty, anæmic; intestines covered with lymph and loosely glued together; omentum much congested; mesenteric glands enlarged . . . In large intestine, solitary glands congested, and at upper part ulcerated; in small intestine, considerable ulceration of Peyer's patches, as also in lower three or four feet. Most inflammatory action in region of the gall-bladder, which was glued to the colon at junction of ascending and transverse portion. Fundus of the gall-bladder ulcerated, and small sacs seen, with bridles of mucous membrane dividing them; the adhesions being torn away, one sac was found ruptured, but it was hard to say whether this happened or not during life. No gall-stones, but thick bile in the sacs.

(3.) LXXI, 66. *Fever; Ulceration of Gall-bladder. Death on the 28th day. Autopsy.* — Laura Etta, aged 6. September 22, 1871. Well till six days ago, when she began to mope, and vomited at intervals; slight diarrhœa for a day or two. Abdomen tympanitic. Vomiting continued; no rose-spots; now no diarrhœa. Pulse from 120 to 138; highest temperature 101° F. Died on the 10th of October.

Autopsy. — Extensive adhesion of peritonæum to the liver and gall-bladder, through which were three ulcerations, as well as ulceration of its whole inside lining. One pint of sero-pus in the peritonæum. Liver pale yellow, fatty. Mesenteric glands enlarged. Peyer's patches of two and a half feet of small intestine not at all ulcerated and very little enlarged. Solitary glands not enlarged. Kidneys normal. Spleen firm.

(4.) LXXXIII, 75. *Fever; Peritonitis. Death on the 28th day* (?). *Autopsy: Perforation.* — Michael L., laborer, had a chill on being put to bed on entrance. Livid. Abdomen distended, painful in right side; roused quickly when addressed. Said he had been ill four weeks; then incoherent. 12 M. Groaning; subsultus; two involuntary thin stools; crying out wildly; hand seeks right

iliac region; when on side lies with knees retracted. 3 P.M. Less congestion in face and left hand and arm, but still in right; pulse less strong in latter. Lungs: backs flat at bases on percussion; crepitant râles. Front: right apex dull, loud, sibilant, and sonorous râles pervading. Right side: fine râles. Heart sounds distant, muffled. When addressed, wild, incoherent cries; decubitus dorsal. Cannot swallow. — 4 P.M. Congestion greater. More quiet. Died at 2 A.M.



Autopsy. Both lungs very firmly adherent. At right apex thickening and a few specks of cheesy degeneration. Both lungs, but mostly the left, congested posteriorly at the bases; parts of both lungs float. One ounce and a half of serum in pericardium; over right auricle roughness from old deposit. *Abdomen:* eighteen to twenty ounces sero-pus; much gas; surface of small intestine and colon much congested. Lymph on *liver* and abdominal walls; some fæces in abdominal cavity. In lower part of small *intestine*, for three and a half to four feet, Peyer's patches and solitary glands enlarged and in places ulcerated; one ulcer had eaten through all the coats, and the base was covered by peritonæum only. Another ulcer at very uppermost limit of disease had perforated, and fæces escaped through a hole one-eighth of an inch in diameter.

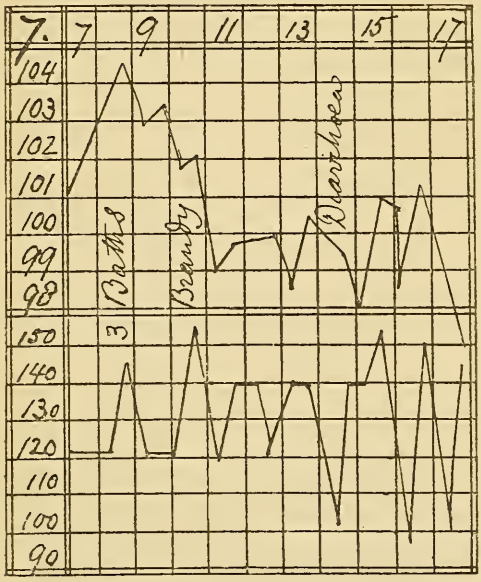
(5.) XCIV, 260. *Fever; Extensive Ulceration. Fatal on the day of admission, and eighth of disease.* — Andrew P., aged nineteen. Swede. Brought from a Cunard steamship at 10 o'clock A.M., August 14, 1873. The ship's surgeon says the patient was taken ill seven days ago, with severe diarrhœa. Countenance feverish; pupils staring, dilated; lips dry and parched; does not protrude tongue; skin hot and dry; respiration normal; pulse 130, feeble. Tympany; râles throughout right lung and at back of the left;

sudamina; rose-spots. Died at 4.30 P.M. *Autopsy.* — The *lungs* were found crepitant throughout, except the lower border of the left, which was solidified, dark red, and not very hard. On section they were mottled with red spots, which, in many instances, could be seen surrounding the smaller bronchi; dark, grumous, tenacious fluid in the bronchi. *Heart:* a few small, whitish patches on mitral and tricuspid valves, but not enough to impair their motions. *Spleen:* triangular in shape, weighed nine and a half ounces. *Intestines:* three feet from the cœcum was an ulcerated patch (Peyer's), and from this place downwards were about a dozen such places, besides a number of small round ulcers; one of the ulcerations near the end of the small intestine was three inches long. There were none in the colon.

(6.) CC. *Fever, fatal from Peritonitis on the thirty-sixth day. Autopsy.* — Paul B., aged 43, born in Nova Scotia, laborer, entered 17th December, 1873. Never ill before; fourteen days ago had pain in the back; a few days after became chilly, lost appetite, and had to go to bed with malaise and headache. Countenance dull; mind sluggish; skin warm and moist; tongue dry, red, coated on sides; anorexia; thirst; micturition free; bowels not regular. Temperature, 102.4°; pulse, 92; respirations, 16. — 16th day. No pain. — 18th. Sponge-bath. — 25th. Two loose dejections. — 28th. Tympany. — 34th. Complains of abdominal pain and tenderness with diarrhœa. — 35th. Countenance anxious; upper lip drawn; increased pain and tenderness, with tympany and rigidity of abdomen; pulse, 120, intermittent. — 36th. Died. *Autopsy.* — Old adhesions of *lungs* and hypostatic congestion. *Spleen:* soft, dark-colored; thrice its normal size. *Intestines:* normal position deranged; the sigmoid flexure ran in the direction of the liver and touched it. The intestines were loosely adherent by exudation; there was no perforation of the bowel. In the small intestines, within three feet of the cœcum, were fifteen ulcerations, most but not all on Peyer's patches; some of them nearer the cœcum, deep,

and holding loosening sloughs; a large one above the valve almost perforating; for a foot and a half below the cœcum were twelve similar, smaller, sloughy ulcers. There was general peritonitis and thirty-six ounces of purulent fluid in the abdominal cavity.

(7.) CV, 48. *Fever; high cerebral Symptoms; Ecchymoses; fatal on the seventeenth day. Autopsy: Peritonitis; Perforation.* — Eleanor P., a shop-girl, aged 22, admitted 26th August, 1874. Her mother says she came from work six days ago with severe headache and kept her room the next day, eating little. When she was next seen, she was found naked, with her hair cut short, wild and confused. Her father had been quite ill "for some time" with typhoid fever. The patient had a similar attack four years ago, after which the catamenia disappeared for six months. On entrance to the Hospital she seemed hysterical; conscious; laughed and cried, and was excitable; tongue clean. Pulse, 120; temperature, 100°; respirations, 28. 8th day of disease, more excitable; delirious; muttering; milk exudes from nipple; rational at times, and more willing to talk; abdomen, though full, not distended; tâche cerebrale noted; had three baths. — 9th. High and wild delirium; sings; refuses medicine and food; no dejection. — 10th. Sordes; vacant, wild look; abdomen very much distended; talks jargon; free dejection after enema. Brandy ʒ ss. every two hours. — 13th. Baths omitted; mutters; pulse

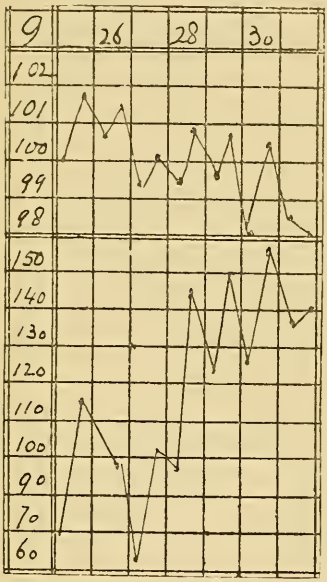


weak. — 14th. Profuse diarrhœa. All over the front of the trunk are scattered ecchymosed spots, like urticaria, colored at first dark red, fading on exposure. Stupor deepening. — 16th. Tongue dry and crusty, protruded for the first time; less tympany; one or two dejections; marked emaciation; occasional sighing respiration; subsultus; still considerable delirium and jactitation. — 17th. Collapse; rallying under treatment; but in the evening at 7.30 o'clock, collapsed finally. *Autopsy. — Lungs:* slightly congested. *Heart:* a little pericarditis. *Spleen:* normal. *Intestines:* a few ounces of yellow pus in the peritoneum, beside some soft lymph on the intestines near the pelvis. About the sigmoid flexure were yellow fæces which had passed a perforation in the colon at this spot; the intestines were intensely congested throughout; in the sigmoid flexure of the colon was a perforation made by a large slough, about two inches in diameter; a few inches above this was another ulcer, nearly as large, whose base was sloughing away, and would have left another equally large perforation; above this were several small ulcers in the colon, just above the cœcum; the ileum was extensively ulcerated, and several small patches were diseased above this; but for three or four feet beyond them they were merely swollen or discolored.

(8.) CVIII, 80. *Fever; Patient moribund on entrance. Autopsy: Pneumonia; granular Kidneys; Ulcerations.* — John O'B., aged 35, laborer, Ireland, was brought to the Hospital, delirious and much emaciated, muttering, with a thick-coated tongue; having been found by the police in a room with clothing and body filthy, there was no history of the case, save that he had been neglected, ill, and starved. Temperature, 99.2°; respirations, 32; pulse too fast to count. Food and stimulants were exhibited, but he sunk and died at 12 o'clock on the 20th. *Autopsy. — Lungs:* a few old adhesions of each pleura; both lungs congested; a spot of pneumonia as large as a goose-egg in the middle lobe of right lung. *Spleen:* dark and very soft. *Intestines:* many large, deep, typhoidal ulcers just above ileo-cœcal valve, and five or six more scattered over the last two feet

of the ileum. *Kidneys:* decidedly granular; capsule tore away portions of gland substance; cortical substance diminished one-half. *Brain:* a little atrophied, with considerable fluid under the dura.

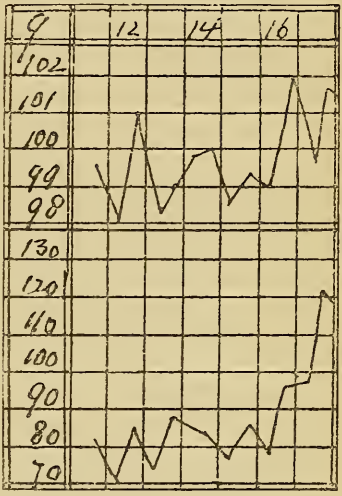
(9.) CV, 154. *Fever. Autopsy: Tuberculosis.* — John G., admitted 25th May, 1881. Can give no account of himself; eyes staring; twitching of head; throws off bedclothes; tongue moist, and coated brown; no cough; belly retracted, not tender. Pulse 60, full; respiration, 18; heart and lungs give no abnormal sounds. — 26th. Tried to get out of bed last night; stupid; no pain. — 27th. Well-marked blue maculæ on belly; quieter. — 28th. Tries to get out of bed; tears his hair and slaps his buttocks. — 29th. Pulse slow and full; conjunctiva injected; respiration natural; wet cups to nuchæ. — 30th. Yesterday, pulse, which had been quite slow and full, became quick and weak; pupils dilated; frothing at the mouth; trifling hæmoptysis; hands cold; eyes motionless and staring; face livid; better after cups and free stimulation; this A.M. much better; answers, though not always intelligently; understands all that is said; takes food and stimulus well. — 31st. Retention of urine; slept well with Dover's powder. — 1st June. Failing, though he has taken his food and brandy well; feeble; cold; countenance congested; respiration labored; coarse râles heard over both chests; died at 10.30 P.M. *Autopsy. — Lungs:* both pleural cavities obliterated by old adhesions. There were a large number of tubercles in each lung, especially at the apices, fewer at the bases. *Heart:* the valves of the left side were a little thickened. *Spleen:* soft. *Intestines:* several small ulcers in small intestines, and larger in the large



intestines, especially in the lower portion. *Peritoneum:* studded with tubercles.

I have allowed this case to stand as it appears on the record, with the title of Typhoid Fever, to illustrate the difficulty of diagnosis in patients entering without a history.

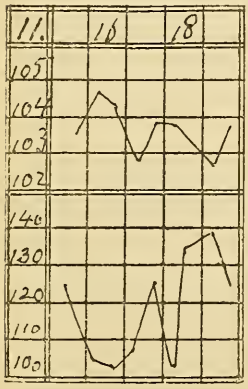
(10.) *Fever; fatal on the eighteenth day. Autopsy: Perforation.* — Bernard W., aged 34, longshoreman; admitted July 30, 1875. Says he had "fever" ten years ago. Ten days since he "took cold," lost appetite, and was chilly; afterwards he had frontal headache, vomiting, constipation, and rachitic pains. He has now a slight cough; tenderness of abdomen; cold extremities; perspiration. Bowels moved yesterday; sleeps fairly. Pulse, 81; temperature, 99°. — 12th day of the disease. Body cool; mind clear; tongue moist, furred; some nausea. — 13th. Last evening, vomiting, relieved by one sixth grain of morphia subcutaneously and one drop of carbolic acid. In the morning the pulse quiet and soft; tongue moist, tip and edges clean, back and centre furred; breathing rapid and intercostal; countenance anxious; abdomen much distended, no tenderness; stupid; urine high-colored, specific gravity 1,025, albumen $\frac{3}{4}$ per cent. — 14th. Abdomen greatly distended, with little pain or tenderness; stercoraceous vomiting, with retching; four ochrey dejections without pain. Slept well after full opiates. — 15th. Twelve thin yellow dejections; retching, little vomiting, with a slight stercoraceous smell. — 16th. Same, but easier. — 17th. Had brandy *ad libitum*. — 18th. Twenty dejections; collapse; urine, color high, acid, specific gravity 1,017, albumen $\frac{3}{4}$ per cent., uroxanthin and urophæin increased. Dead.



Autopsy. — *Chest:* contained five pints of fluid. *Lungs:*

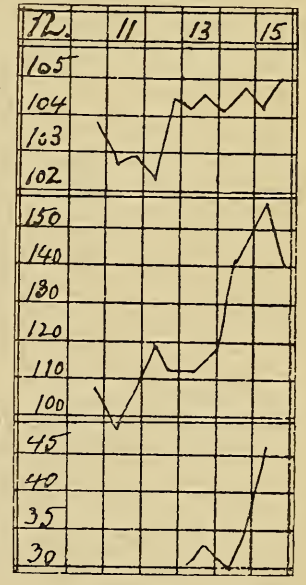
compressed, both adherent to parietes at apices. *Heart:* pericardium contained a slightly increased amount of fluid. *Abdomen:* distended with fluid and gas, six pints of yellowish serum removed from its cavity. Some pus was seen, especially in the neighborhood of the ileo-cœcal valve. The intestines were adherent to the walls throughout. The omentum much thickened and adherent. One small round ulcer found in the greater curvature of the stomach; numerous ulcerated patches, of irregular shape and situation, in the intestines, most in the duodenum; one ulcer in duodenum, and one in the lower ileum, through which fœcal matter escaped into the peritoneal cavity. In the vicinity of the perforation the intestines were agglutinated by recent lymph.

(11.) CXX, 129. *Fever; fatal on the nineteenth day. Autopsy: Peritonitis; Ulcerations; Sloughs.* — Mary F., admitted August 2d, 1875; two weeks ago had rachitic pains, headache, thirst, nausea, vomiting, abdominal pain and tenderness, fever, bronchitis, with no sputa, and, later, the diarrhœa became excessive. Now she is very weak, deaf, and complains of pain in stomach and bowels. Respirations, 40, with a groan; pulse, 132, bounding. — 16th day of the disease. Urine pale, specific gravity 1,022, considerable mucus, and vesical epithelium, albumen $\frac{3}{4}$ per cent. — 17th. Excessive diarrhœa, dejections involuntary. — 18th. Tongue, dry and hard; ten dejections, copious, thin, and yellow; skin, soft and moist, subsultus; slight intestinal hemorrhage. Pulse, 132, weak; abdomen tympanitic, not very tender; rose-spots, small and inclined to ecchymoses. — 19th. Eight dejections; tongue less coated; apparently better, but, 20th, failed steadily and died. *Autopsy.* — *Lungs:* right adherent, its lower lobe congested, not crepitant; left lung normal. *Heart:* normal, except some degree of thickening of mitral; aorta showed several atheromatous patches. *Intestines:* the peritoneal surfaces were congested, and in places stained with blood; the mucous membrane uniformly



reddened except at pylorus; the Peyer's patches were all more or less diseased, some were slightly ulcerated or sloughy; there were also several large ulcers in the large intestine. In the *ovary* was a recent corpus luteum, and a triangular clot in the uterus, making a cast of its cavity.

(12.) N. & R., II, 124. *Fever; fatal five days after admission; cerebral Symptoms predominant. Autopsy.* — Thomas D., aged 36, farm-hand, admitted December 10, 1877, and assigned to the Nervous and Renal Department. The patient says that he feels the vengeance of God poured out upon him and is in almost dumb despair; that he has not been able to eat for four weeks, and he has had no sleep. He drinks lager beer, but little liquor; has had headache and general pains. There are transverse scars on each side of throat, seemingly suicidal. Anorexia; diarrhœa; stares upwards, with eyes wide open; mouth in continual motion, as if it were dry, but the tongue is clean and moist; there is some muscular twitching, almost clonic spasms, less when attention is engaged; it is said that he has had fits, but he will not talk of them; is slow to answer, but does so promptly when interested. Lungs and heart yielded no abnormal sounds; abdomen tender, specially in right iliac fossa, with gurgling; two doubtful rose-spots. — 12th. Slept after twelve last night, and drank milk freely; centre of tongue coated; in afternoon, says he is in pain all over, and had one reddish dejection. — 12th. Little sleep; had slight epistaxis. — 13th. No sleep during night, but sleeping at the morning visit; sibilant râles at bases of both lungs posteriorly; also prolonged expiration; percussion of higher pitch at left apex, where also is coarse respiration; began to cough last night; sputa white, frothy with black specks.

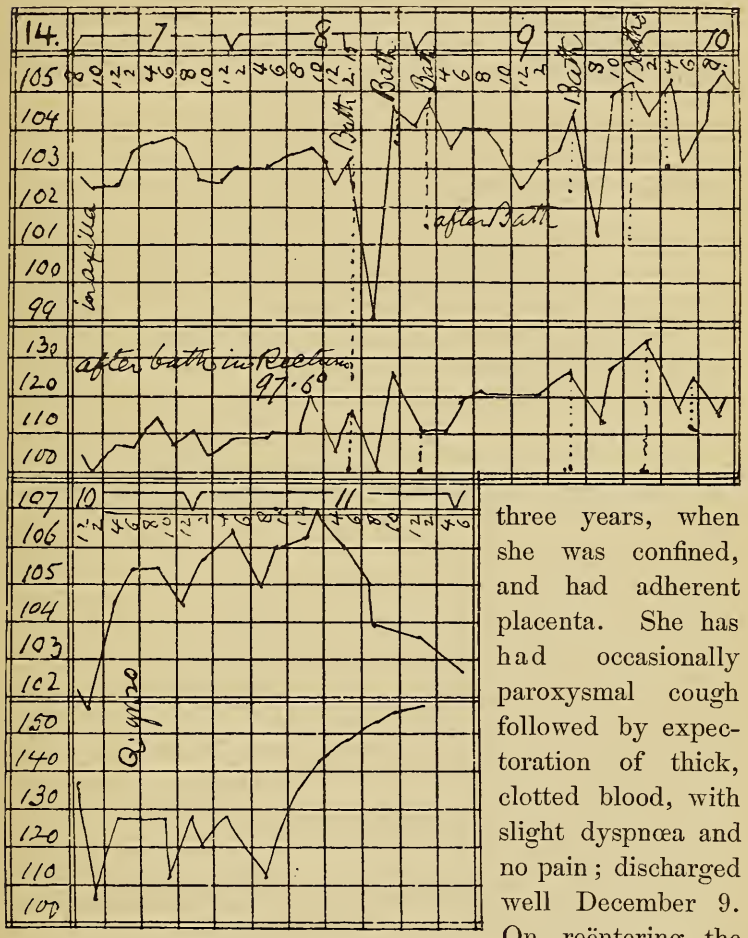


— 14th. The same; wild, excited, grated his teeth; last night had thirty grains of cinchonidia, in two doses; to-night, at 7 o'clock, fifteen grains, and at 8, fifteen grains. — 15th. Last night, at 11.30, suddenly had epileptiform fit, lasting half a minute, but consciousness did not return for an hour or more; just after the fit the pulse could scarcely be felt; pupils normal; pulse rallied after ʒ ij. tinct. digitalis subcutaneously; profuse sweat; twelve to sixteen ounces urine by catheter; this morning, cyanotic; Anstie piston-movement of larynx began last night, and was noticed this morning after the convulsion; died at 10.20 A.M. *Autopsy. Lungs:* cicatrices of old disease at apices; left lung showed no consolidation, but all the signs of bronchitis; the lower two-thirds of the right lung was consolidated. *Spleen:* considerably enlarged. *Peyer's patches:* extremely ulcerated. *Brain:* the membranes normal; thin blood-vessels, very full; white and gray substance strongly congested; very red puncta vasculosa, six or eight times more numerous than usual; no fluid in ventricles; substance of brain firm.

(13.) CLVIII, 100. *Fever; moribund when admitted; Delirium; Ulceration of Peyer's Patches; Death on 14th day. Autopsy.* — Wm. F., 8th October, 1878, admitted delirious, and has been ill twelve days; little known of his history, except that his wife could not restrain him; he had one dejection the day before entering hospital. His pulse was 110, weak; temperature, 102.2°; gurgling in right iliac fossa; was freely stimulated, but did not rally; on the 9th the temperature rose to 103.8°, and he died at 12.20 P.M. *Autopsy.* — The *lungs* showed a little hypostatic congestion posteriorly; the *spleen* was intensely injected and pulpy, its capsule dense and glistening, weight, 19½ ounces. *Intestines:* a few Peyer's patches and glands of Lieberkuhn in the vicinity of the ileo-cœcal valve were much swollen, and those nearest the valve in a state of necrosis; the whole colon was highly injected, and some very dark spots of injection were noted, among which might possibly be some small ecchymoses. The *liver* was engorged and hyperæmic; its acini tolerably distinct. Many

of the *mesenteric glands* were engorged and enlarged, and, on section, necrosis was found.

(14.) CLXV, 6. *Fever; Death on 13th day. Autopsy: old Disease of Liver; Gallstones.* — Mary M., aged 27; married; admitted October 25, 1879. Was in hospital August 20, 1879, with gastroduodenitis. Has seen no catamenia for



three years, when she was confined, and had adherent placenta. She has had occasionally paroxysmal cough followed by expectoration of thick, clotted blood, with slight dyspnœa and no pain; discharged well December 9. On reëntering the hospital she says she remained well till seven days ago, when she became chilly and feverish, with much pain in the back and left side; ten or more dejections daily; cough; very little headache; no vomiting; no epistaxis;

some delirium; T. 102.6°; P. 100; R. 40. When she was here before, she had some dulness at the left apex, front and back; no râles; liver enlarged; urine normal. — 8th. Tongue has a thick yellow coat, moist, with some sördes; four or five rose-spots on the abdomen; many sibilant and sonorous râles over the front of the chest; she is restless, though dull and stupid. — 9th. Slept quietly after five grains of Dover's powder. — 10th. Tongue moist and red at edges; coated in the middle; many rose-spots; temperature and pulse creeping up. At 2 P.M. the temperature was 103.2° in the axilla. At 15 minutes past 2 she had a tub-bath lasting 20 minutes (water at 100° reduced in five minutes to 70°); the pulse was weak, but did not vary much in the bath; the finger-nails became blue; friction was employed while she was in the water. After the bath she was wrapped in blankets and rubbed; the pulse became weaker (100 to 110), and at 5 o'clock she had half an ounce of brandy; at 6 P.M., half an ounce of brandy and a tub-bath. After ten minutes in the bath she looked so badly and the pulse became so weak that she was taken out, rolled in blankets, and well rubbed. At 10.30 another bath of 20 minutes. After this she slept several hours during the night; one large dejection in the evening, and four smaller in the night. Brandy ʒ ss. every two hours; took her milk well. — 11th. Skin cooler; pulse stronger. Brandy ʒ ss. every hour and a half. At 2 P.M. she had a tub-bath, cooled to 66° for 23 minutes, and another at 7.30, with slight friction, after which she had a severe chill. She had half an ounce of brandy before each bath. At 12 P.M., T., 105.4°; had a tub-bath; was moderately rubbed, and had a slight chill; after this she slept pretty well. — 12th. Another tub at 9 A.M., and well-rubbed; no chill; tongue clean at edges, black coat in middle, somewhat moist. The baths were stopped. In the evening she had ten grains of quinine, repeated in an hour; pulse weak and rapid. — 13th. Quite delirious at night; passed urine and fæces involuntarily; had stimulus and quinine freely, but pulse grew weaker and more rapid, with delirium and dilated pupils. There were no abdominal symp-

toms. At 3 P.M. the pulse became still weaker, circulation stagnant in the hands, respiration very rapid and noisy. She died at 9 P.M. *Autopsy.* — The *lungs* were injected with blood. *Peyer's patches* in a state of formative hyperplasia; the solitary follicles of large intestine and just above the ileo-cœcal valve were enlarged. The *kidneys*, hyperplastic, weighed $8\frac{1}{2}$ and 10 ounces respectively. The *liver* weighed 5 pounds 13 ounces, contracted on the surface by old cicatricial tissue, and there was a large accumulation of gall-stones near the centre. The *mesenteric glands* were hyperplastic.

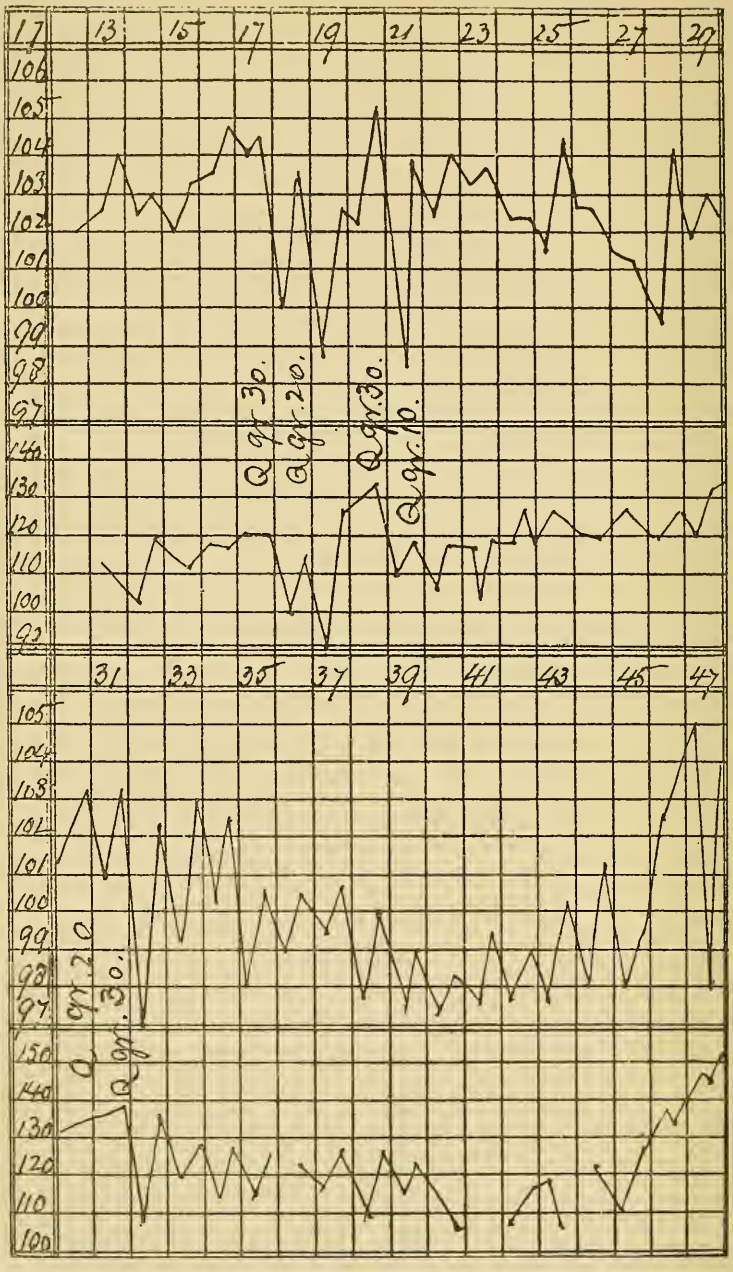
(15.) CLXII, 181. *Fever; Paralysis; Death. Autopsy: Ulcerations; Emboli of cerebral Arteries.* — Robert G., aged 49; married; was transferred from Dr. Edes's service in the Nervous and Renal Department, March 8, 1879. He has had much domestic trouble and care, and been failing for eight months, with no other positive symptoms than pain in the left side and back, anorexia and feebleness. There is some tremor of tongue, hands, and eyelids, not violent, and only on voluntary movement; he does not drink; manner is hesitating and peculiar; speech interrupted; tongue dry and hard; sordes; constipation; slight tenderness of abdomen; tympany. To have sponge-baths, one-third alcohol, every three hours, and fever mixture every four hours; brandy, half ounce every two hours. — 9th. Stupid; sleeps much; a few dark spots on abdomen and thighs (*tâches bleuâtres*); slight diarrhœa. — 10th. Retention; catheter twice daily; diarrhœa ceased. — 11th. Urine, albumen one-half per cent, otherwise normal. — 14th. Patient rose when nurse's back was turned, went to the water-closet, fainted and fell; when put to bed no pulse could be felt in the right arm, and was feeble in the left; left pupil dilated; loss of sensation and motion on the right side; respiration, with puffing cheeks; some relief followed a dose of half an ounce of brandy. — 15th. Slight improvement; tongue dry and protruded to the right; does not move the right side; catheter required twice daily. — 17th. Moves the right side somewhat; a discharge of bloody purulent fluid from left ear. — 20th. Some improvement; moves the right arm and leg more; no pulse in the right wrist; feeds well;

temperature falling; bowels normal. — 21st. This morning the patient had a chill; face cyanotic and covered with perspiration; respirations, 24; tongue very dry; in the afternoon rather brighter, tried to speak; has some cough; there seems to be some dulness over lower right side and front of chest, where respirations seem diminished, but extended examination is inadmissible. — 22d. Somewhat brighter; tongue still very dry; respiration less rapid; patient seemed to take some notice last night; catheter twice daily; takes food well. — 23d. Very stupid; notices nothing; eyes closed; respiration rapid; temperature 104°; does not protrude tongue. Died at 1.35 P.M. *Autopsy.* — *Lungs:* dry in posterior portion. *Spleen:* small, atrophied, no other change. *Intestines:* mass of Peyer's patches enlarged, and ulcerated through to the muscular coat. *Kidneys:* a trifle cloudy, otherwise not abnormal. *Brain:* emboli in right carotid and middle cerebral arteries, and same in left cerebral, further up, near the posterior bifurcation of the artery. A hemorrhage had taken place into the convolutions which were supplied by the posterior branch of the superior middle cerebral artery. The rest of the brain was not abnormal. The chart of this case is missing.

(16.) CLXVI, 189. *Fever; no History; moribund on admission; Death on the 2d day after entrance. Autopsy: Ulceration of Peyer's Patches.* — Casper K., aged 28, admitted August 6, 1879. The patient's manner was wild, his talk incoherent, and no satisfactory answer was to be had; tongue clean and moist; temperature, 102°. — 7th. Delirious all night, trying to get out of bed, and wandering about uncontrollably; this morning answered questions more intelligibly; eyes dull; expression listless; skin dusky; tongue inclined to dryness; pulse 120; temperature 100.2°. In the afternoon very delirious and unmanageable. At 5.30 o'clock he collapsed; rallied slightly under stimulants, but sunk, and died at 6.30 A.M. *Autopsy.* — The *lungs* were engorged with blood. The *spleen* was four times its normal size. *Peyer's patches* much enlarged and swollen, those near the ileo-cœcal valve a little eroded; the solitary glands

in the large and the small intestine were hyperplastic, and eroded on the surface; the *kidneys* hyperæmic; the *liver* enlarged and cloudy; the *mesenteric glands* much enlarged.

(17.) CLXVII, 154. *Fever; Death on the 48th day. Autopsy: deep Ulceration of Peyer's Patches.* — Elizabeth M., aged 25, admitted 12 o'clock, 1879. This patient says she was well till twelve days ago, when she had chills, pain in the back and head, epistaxis four or five times, anorexia, no diarrhœa. Tongue moist, thick, creamy coat; face dull, listless; tenderness at epigastrium and right iliac fossa. — Sponge baths; milk diet. — 13th. Delirious in night, requiring forcible restraint. — 14th. Pulse weak; whiskey ʒ ss. every four hours, during night. Rose-spots. Urine 1,024, acid. — 18th. 104.2°. Quinine, 30 grains. — 19th. 103.2°. Quinine, 20 grains; four dejections; face bright, but articulation slow and heavy; brandy, ʒ ij. every two hours. — 22d. Tongue less coated, but red and glazed in the centre; restless, but not delirious at night; feeds well. — 23d. No dejection since yesterday; many rose-spots; pulse very weak; brandy ʒ iij. every two hours. — 25th. Three involuntary dejections last night. ℞. Quinine gr. ii. every two hours. — 26th. Six ounces of brandy a day. — 27th. Appears about the same, perhaps brighter, says she feels better. Tongue less glazed. — 29th. Slight delirium last night; tongue dry and glazed; marked prostration; subsultus; constipation; takes milk freely. Whiskey substituted for brandy in the same dose. — 31st. No delirium last night. Quinine, 20 grains in two doses; seems brighter; tongue cleaning. — 36th. Gaining slowly. — 37th. Temperature gradually falling, but pulse high (110 to 118); feeds well. — 38th. Pulse coming down. — 45th. Temperature rose to 100.5° last night; pulse 120; feels weak; this morning temperature 98°; pulse 112; some sordes remains; tongue dry and fissured; dislikes milk, which she has taken eagerly; asked to have broth and beef-tea. — 46th. Vomited twice or thrice last night; 102.6°; 140; chest normal; no tenderness nor distension; enema, whiskey ʒ iv. — 47th. Yesterday a visitor gave her a pear, which she ate; rejects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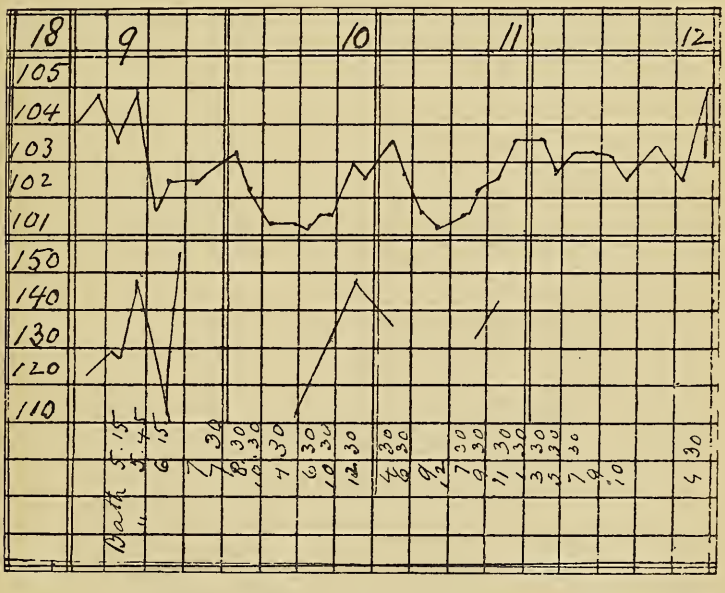
milk and whiskey; is irrational and delirious; livid; tongue moist; champagne and soda. —48th. Deep prostration; failing. In the afternoon three severe intestinal hemorrhages; in the evening appeared better; at 8 and 11 o'clock had rectal injections of gallic acid. The bleeding ceased after ʒ ss. fluid extract of ergot, subcutaneously. Took milk in ʒ i. doses by mouth, also brandy and carbonate of ammonia. After excessive restlessness, and calling for ice, she died at 3.50 A.M. *Autopsy.* —The *lungs:* normal, except for subpleural ecchymoses. *Spleen:* weighed five and one-half ounces; moderate hyperplasia of Malpighian corpuscles; otherwise healthy. *Kidneys:* anæmic. *Intestines:* not abnormal till the middle of the ileum was reached, where Peyer's patches were in a state of ulceration, in many the erosion extending to the lower part of the muscular layer, and sometimes perforating to the serous coat; the solitary follicles in the lower gut were deeply ulcerated. The *liver* was smaller than normal, and considerably fatty from cell-degeneration. The *mesenteric glands* not abnormal.

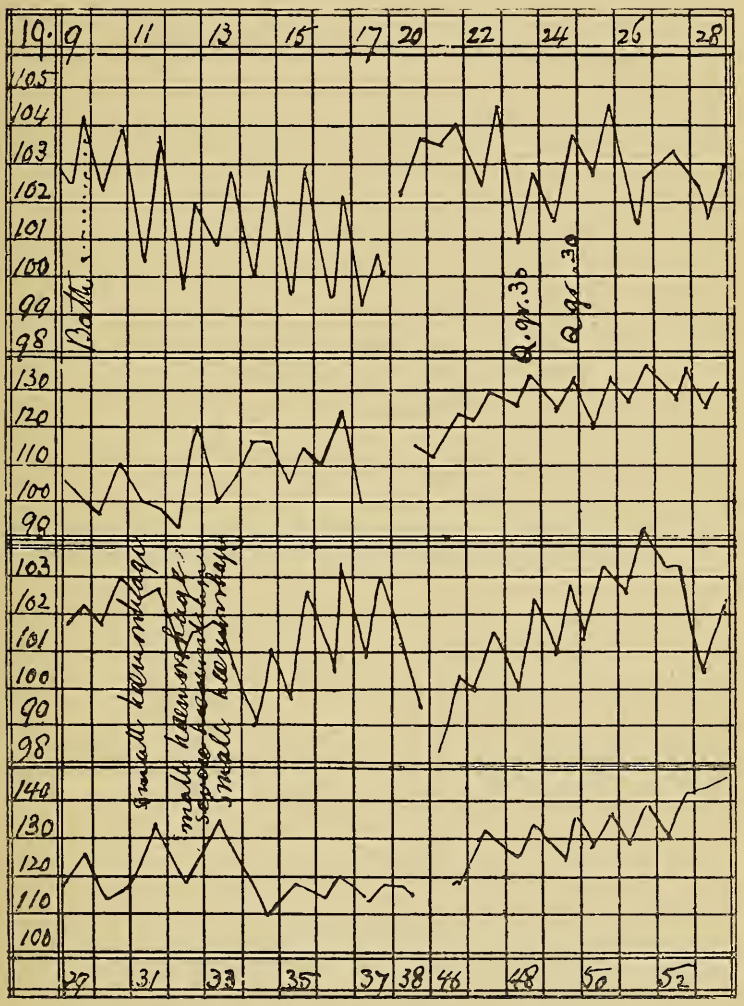


(18.) CLXXV, 205. *Fever; Delirium; Vomiting: Death on the 13th day. Autopsy: Peyer's Patches ulcerated,*

not deeply. — Kate G., aged 8, admitted August 2, 1880. Says she was well till eight days ago, when she ate green fruit; vomited and had high fever, with much abdominal pain; for two days passed no urine; is constipated; vomited twice last week with trace of blood; no epistaxis; headache. On entrance, pain in abdomen; no cough; tongue coated; somewhat delirious; tried to get out of bed and fell, receiving a cut over the brow. The respirations average 45; she feels badly and cries much. In the evening had the wet-sheet baths. — 10th. Vomited much; fed by enema; this A.M. four light-colored dejections; brandy ʒ iij. in twenty-four hours. — 11th. Vomited more last night. — 12th. Vomits less. — 13th. By careful feeding she got ʒ i. milk every hour through the night, with lime-water; coma-vigil; died at 7 P.M.

(19.) CLXXVII, 169. *Fever; Intestinal Hemorrhage; Death on 57th day. Autopsy: Pneumonia of left Lung, deep Ulceration of Peyer's Patches.* — George N. S., aged 38, admitted 26th October, 1880; says he has always been well till a week ago, but attended to business (that of a stove-dealer) till to-day. He complains of pains in back, shoulders, thighs, and abdomen, and has had severe headache three or more times the last fortnight; the bowels are regular; no epistaxis; slight cough, no expectoration; complete anorexia; remembers no chill; tongue glazed, red, with central brown streak; mind dull, face listless; abdomen round, tense, tympanitic, not tender; rose-spots. — 9th. Had morphia, chloral, and bromide, which kept him quiet five hours, after which he got up and ran about the ward; slight subsultus. Urine 1018; urates increased; albumen $\frac{1}{8}$ per cent. — 10th. Still, but slept poorly; two dejections; tongue dry but clearing. — 12th. Six dejections. Up several times in the night. — 16th. Tongue dry and scaly; pulse intermittent. — 20th. Sponge bath. — 21st. One dejection daily. A new crop of rose-spots. Has brandy ʒ i. every two hours. — 22d. Quinine, gr. 30, in two doses; the brandy every hour. — 23d. Quinine, gr. x., at 12 and at 1. — 24th. Copper and opium pill for diarrhœa (four dejections) and ten grains of quinia, repeated; sponge bath. — 25th. Five dejections. Tongue

very dry; less tympany; several yellow dejections, some involuntary; sponge bath. — 26th. Five dejections. Turpentine gtt. v. every two hours, and stupe of the same; brandy every two hours with quinia, and omit the beef-tea

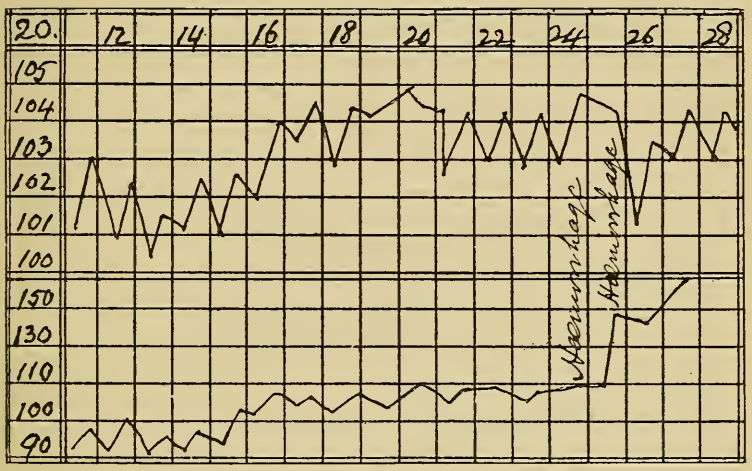


he is having.—28th. Omit quinine. — 29th. Four dejections. —30th. Delirious last night; less diarrhœa. —31st. Seven dejections. A trace of blood in the motions last night; another this morning to ʒ ix.; belly softer. —32d. Four dejections; a severe hemorrhage last night; slight one this

morning; turpentine, champagne. — 33d. Four dejections. Hemorrhage yesterday morning; two small ones last night; two this morning and one this afternoon. — 35th. Six dejections. No blood in the stools. — 36th. Six dejections. Tip of the tongue moist; may have broth with vegetable juices; four grains of quinine every four hours. — 37th. Two dejections. — 38th. One dejection. — 40th. A little, fine-minced, raw beef; doing finely, but the pulse, though strong, is quick; to have sherry instead of brandy; constipated; copious dejection after enema. — 48th. Return to milk diet; pulse and temperature rising again, and condition generally unsatisfactory. — 49th. A light-colored dejection; complains much of pain in the left foot. — 50th. Worse; brandy ʒ ss. every two hours; turpentine stupe. — 52d. Profuse diarrhœa. — 53d. Much abdominal pain. — 54th. Complains of pain only in the foot, where nothing abnormal can be seen or felt. — 55th. Depressed and crying. — 56th. Got out of bed. — 57th. Died at 9.45 A.M. *Autopsy.* — The left *lung* was found to be in a state of gray hepatization in the lower half. *Spleen:* weighed 12 ounces, was pulpy and injected, but no hemorrhages. *Intestines:* ulcerated from the jejunum downwards, in Peyer's patches and solitary follicles, some ulcers involving the muscular coat. *Kidneys:* the tubules cloudy, the mucous membrane opaque, weighing each 7 ounces. *Mesenteric glands:* hypertrophic.

(20.) CLXXX, 160. *Fever; Hemorrhages; Death on the 28th day. Autopsy: Sloughing of Peyer's Patches.* — John H., aged 21; admitted 26th August, 1880. A week ago was attacked by headache, pains in back and bones; none in abdomen till last night; is constipated; had chills at first; for two days a slight cough; feels weak and tired; appetite capricious; tongue moist and coated. — 9th day of the disease. Has passed a restless night; no cerebral symptoms; rose-spots, gurgling, and tenderness; no tympany. — 10th. Doing well. Urine normal. — 16th. An access of febrile symptoms yesterday, without known cause; is comfortable to-day. — 18th. Pulse flagging, soft, compressible; brandy ʒ i. every two hours. — 21st. Doing well. — 24th. Continued

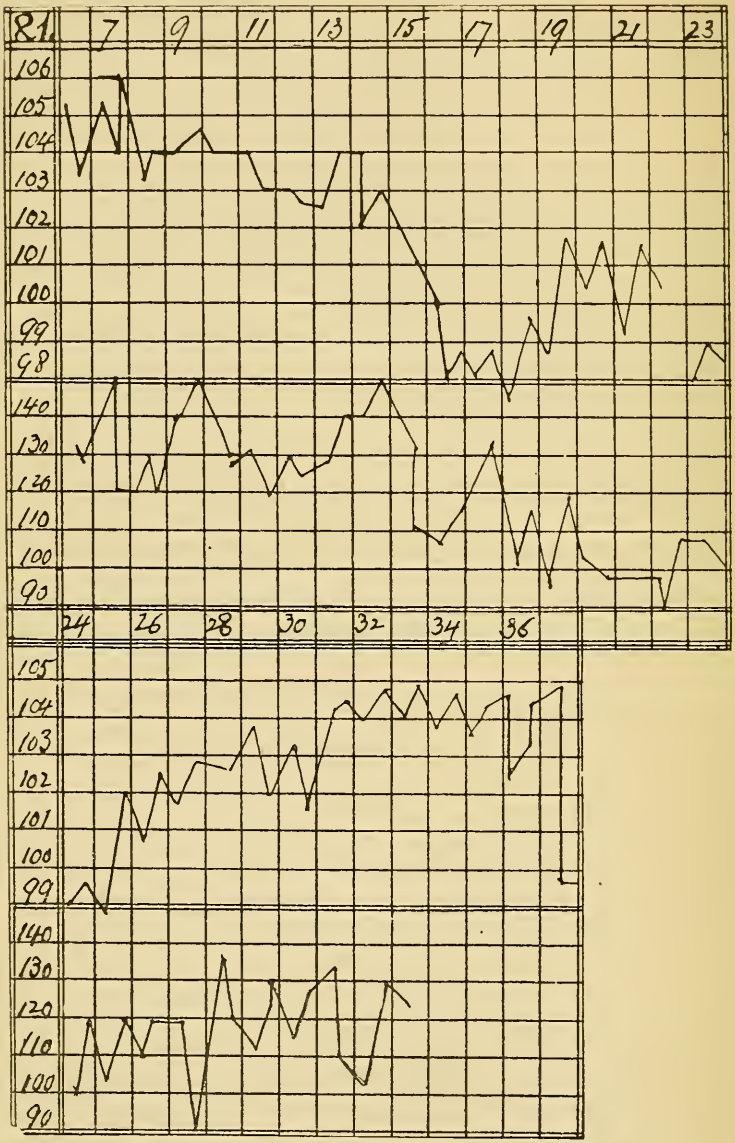
high fever with slight morning remission; tongue dry in centre, more tympany. — 25th. Four dejections, all containing blood. — 26th. Three slight hemorrhages yesterday; tongue moist; mind clear. — 27th. No recurrence of hemorrhage; delirium; tongue dry and brown; pulse small; many liquid offensive stools in the night. — 28th. Pulse 150, running and weak; delirium; no dejection; died at 3.30 A.M. *Autopsy.*



— *Lungs:* in a state of hypostatic congestion and œdema. *Heart:* soft. *Spleen:* $10\frac{1}{4}$ ounces, soft and pulpy; Malpighian bodies indistinct. *Intestines:* Peyer's patches and solitary follicles enlarged near cœcum, the affected portions in tubules stages, from hyperplasia to sloughing. *Kidneys:* various cloudy, cortex increased. *Stomach:* mucous membrane cloudy and swollen. *Liver:* cloudy. *Mesenteric glands:* enlarged, succulent; one or two necrotic spots visible.

(21.) CLXXVIII, 147. *Fever; Pneumonia; Hemorrhages. Death on the 38th day. Autopsy: Consolidation of right Lung; deep Ulceration of Peyer's Patches.* — Emma P., aged 18. Admitted 5th June, 1880. Five days ago the patient was taken with headache and pains in back, legs, and side, which she laid to a cold; on the second day she took salts, the purging from which has lasted; she has vomited twice or thrice, and had tinnitus; no epistaxis; cough, with yellow

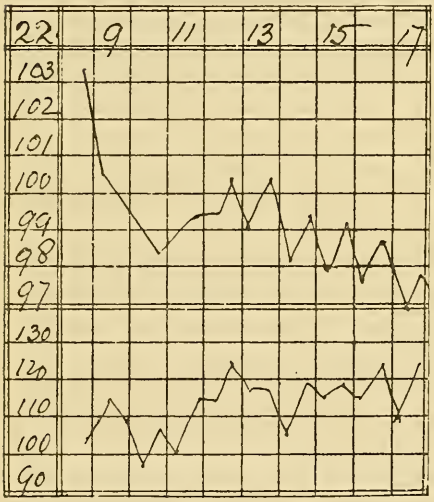
sputa; incontinence of urine. — 7th day of the disease. Delirium, which yielded to Dover's powder; mind clear; face less



dull; tongue moist, with a dirty brown coat. Muriat. ammon. 5 grains; ex. tarax. gr. 2; every 4 hours milk; sponge baths. Evening: very dull and listless; right cheek flushed;

tympany; tenderness; involuntary diarrhœa. Chest: good normal resonance; many sibilant and sonorous râles at the base of right, front and back; slight cough; scanty expectoration. Delirious; deaf; increasing diarrhœa; brandy ʒ j. every 2 hours. — 11th. Somewhat brighter, but very weak; sherry instead of brandy. — 12th. More fever since yesterday morning, with cough and pain; abdominal symptoms somewhat better; resume brandy. Cough-drops. — 13th. Mind clear; less deafness; tongue moist and cleaning, but pulse the same; less tenderness; no diarrhœa. — 14th. Mind clear. Tr. digitalis gtt. x. every 6 hours. — 15th. Same; dulness base of right back; respiration over same area bronchial and broncho-vesicular, with fine, crepitant râles; cotton jacket; quinine gr. 3 ter die. — 16th. More comfortable. — 17th. Nausea and vomiting; omit all medicine except quinine; less fever. — 18th. Much more easy; no vomiting; pulmonary signs improving. — 19th. Some tympany remaining, with great tenderness at right hypochondrium. 20th. Is comfortable. — 22d. Diet increased. — 25th. Flatness of right lower lobe with tubular respiration; no râles; heart gives a mitral, systolic souffle, loudest at apex; pulse 90, small; general condition seems to be improving. — 26th. An access of fever and pain in right mammary region. — 27th. Calls herself more comfortable, but prostration increases. — 28th. Four loose dejections with abdominal pain and tenderness of right iliac fossa; temperature and other physical signs better. — 31st. Diarrhœa continues. — 32d. Progressive exhaustion; patient irritable, refusing food and medicine; fever and diarrhœa persist; five loose dejections in the night; brandy and Dover's powder. — 33d. Brighter but very weak; involuntary stools; tongue dry and brown. — 34th. A little stronger; mind clearer, but more irritable; takes food and medicine better; decided improvement in physical signs at right back; no diarrhœa. Three grains of quinine morning and night. — 38th. Temperature fell five degrees this morning; pulse stronger and slower; profuse sweat; wild delirium; drowsiness; one involuntary dejection. — 39th. Slightly more fever, but feels easy; mind clear; tongue moist; pulse good. At 9 in the morning she had a dejection of clotted

blood, ʒ iss., following a normal motion; tenderness at right iliac fossa; at 10 o'clock, a discharge of ʒ viij. of fluid and clots left her prostrate and blanched; before 12 the patient had two more hemorrhages; in the afternoon another, and at 10.30 she died. *Autopsy.* — *Lungs:* the right was partially consolidated; the bronchial mucous membrane thickened and injected. *Heart:* showed fatty degeneration of the muscle, with thickening and contraction of the mitral and aortic valves. *Spleen:* of normal size, dark color, and diminished firmness. *Intestines:* large ulcers of Peyer's patches, presented numerous bleeding points; twelve or fifteen deep ulcers were seen in the descending colon.



(22.) CLXXVIII, 252. — *Fever; Jaundice; Death on 18th day. Autopsy: Nutmeg Liver; swollen Peyer's Patches; Nephritis.* — Thaddeus W., age 54; admitted 9th July, 1880; reports pain in head, back, and legs, with loss of appetite and fever for a week past; on the third day diarrhœa set in, and yesterday he first noticed jaundice, cough, and expectoration. There was neither epistaxis, nausea, nor vomiting. To-day two loose dejections; is weak and sleepy; yellow coat on tongue, edges red and clear. — 9th day. Mind clear; drowsy; tongue moist; face flushed; universal jaundice; pulse compressible; slight tenderness in right iliac fossa; sponge bath every two hours while temperature is at 102°. Brandy ʒ i. every three hours; quinine 3 grains, three times a day; milk *ad libitum.* — 10th. More jaundice; tenderness in right hypochondrium. — 11th. Four dejections; drowsy, but easily roused, and rational; pulse compressible; less tenderness; jaundice as before. Urine, yellowish-green, acid, 1,011; a

trace of albumen; bile-pigment present; sediment trifling; a few leucocytes and round (renal ?) epithelium, bladder epithelium, and a few granular casts. — 14th. Five dejections; comfortable. — 15th. Three dejections; skin of a leather color; less feverish; less drowsy: tongue moist and clean at tip and edges. — 17th. Four dejections; increased prostration; mind now dull; passes urine and fæces under him; tongue loaded with moist and heavy coat, and cracked transversely; no tympany, nor rose-spots, nor pulmonary physical signs. Died 18th, at 4.74 P.M. *Autopsy.* — *Lungs:* hypostatic congestion and œdema. *Spleen:* small, and of diminished firmness. *Intestines:* mucous membrane injected, and Peyer's patches swollen, though not ulcerated. *Kidneys:* enlarged and in a state of cloudy swelling; a calculus in one calix. *Liver:* enlarged, and in a state of nutmeg atrophy.

I.

An attempt is here made to show the results of treatment of typhoid fever in the hospital. This has been found difficult, and the issue of the trial unsatisfactory. Most of the cases have had more than one form of treatment, — as sponge-baths and acid, tub-baths and large doses of quinia, alcohol and baths, and the like. The treatment has differed in the several years, and in the practice of the physicians in attendance, and the results are given below as well as they can be ascertained. Consideration was given to the stage of the disease, the period when the treatment was given, which of two or more forms of medication would probably have the most influence, and the customary methods of each physician.

No treatment covers all occasional medication, such as a sedative dose, or fever-mixtures for a few days, and a sponging now and then. Most of the deaths which happen under this heading are the moribund patients, who had, if they could receive any relief, but an opiate or stimulant before they died. The rest of the deaths in this class are the cases which, apparently going on well, take a sudden turn for the worse, and die after vain efforts to rally them. This class, with the above exceptions, represents the mildest cases.

Cases having no treatment	371
Died	29
Per cent.	7.8

Cases treated by quinine, salicylic acid, etc., in doses of 5 grains or less three times daily	94
Died	9
Per cent.	9.5

These were generally mild cases.

Cases treated by quinine or salicylic acid in doses of 10, 20, or 30 grains. Almost all bad cases	52
Died	6
Per cent.	11.5

Cases, mostly mild, treated chiefly by the mineral acids	31
Died	4
Per cent.	12.8

Cases, mostly mild, in the spring months, treated by calomel (10 grains at night, and a saline cathartic in the morning)	37
Died	5
Per cent.	13.2

Cases treated by sponge-baths	167
Died	25
Per cent.	14.9

These were chiefly of a mild type; but several bad forms of the disease are included.

Cases, generally of the severest forms, principally treated by tub-baths (given when temperature demanded, at least twice daily for 3 days)	87
Died	16
Per cent.	18.3

Cases, largely of the most formidable sort, treated by alcohol (ʒ ii. or more of brandy, or ʒ iii. or more of sherry, or a pint or more of champagne, daily)	202
Died	75
Per cent.	37.1

In looking over these cases I feel justified in believing that 600 of them would have done well without any other treatment than milk, with quiet and careful nursing. Of 500 others, very many have been saved by the use of remedies under close observation. In treating typhoid fever the thing to know is, whether or not our patient needs the application of remedies, as distinct from food and nursing. My hospital experience has taught me that the knowledge is imparted by the rapidity of the pulse, in all but a few cases.

II.

Of the patients whose cases have been commented on, 192 were, during the last 10 years, in my service, which usually comprises the last three months of the year. I propose to make a few notes of the experience gathered from them. In the Boston *Medical and Surgical Journal* for October 9, 1879, 150 of these cases formed the basis of an article which is necessarily drawn on for the present purpose.

If our knowledge of the CAUSES of typhoid fever depended on the patients brought to this hospital, it would be slender. They always refer their illness to cold, anxiety, wrong diet, or over-work, and the friends who attend them are no wiser. The patients seldom come in before the second week, when they have alarmed relatives and neighbors by their sickness and delirium, and many are brought too late for our care to be of any service, — so that very little is to be learned from them. A large proportion are laborers; many are clerks, mechanics; a goodly number are servants from houses well situated and drained, and supplied by Cochituate water, of which, indeed, most of our patients have been drinking. A great many are sent in from crowded tenement-houses, and

sometimes one hovel will furnish two or more cases; but this is an exception. The patients come from the old central and crowded parts of the town in certainly no greater proportion than from the newly annexed and half-rural sections. *Contagion* is not a cause of the fever. One fatal case was that of a woman who had nursed a sister through the sickness; one nurse died of it in 1878, and two others were stricken with the fever at that time from neglect of orders regarding bed-pans. No cases are recollected before disinfection was as rigorously enforced as it is now. Six hospital servants not in attendance on the sick are included in the number under consideration, besides one nurse in the fever wards, who recovered, and one ward-master, aged 50, who died in the first week. No house physician or surgeon is known to have had typhoid, although diphtheria and scarlatina have claimed them. So that the proportion of fever among the inhabitants of the hospital is no greater than in the houses outside.[1] This disease resembles contagious disorders in usually exempting the patient from subsequent attacks; and when one says that he has had just such an illness before, the possibilities of tuberculosis or other malady must be thought of. I have known large families, living together or separated, among whom it is the tradition that a continued fever has never occurred. But it is a sickness which almost every one in New England has in childhood and youth, and its causes, except in epidemics which have been traced to the contamination of the water-supply, have yet to be made plain to me.

As has been noticed above, the DIAGNOSIS of our cases is generally settled by the time we receive them. Acute tuberculosis and meningitis oftenest simulate typhoid. Aural abscess in fever is frequently taken for meningeal inflammation. One of the cases considered, entered with pneumonia, which he laid to sleeping on the ground; but when the pneumonia declined, he was found to have diarrhœa, rose-spots, and tympanitis, — the beginning of a long sickness; several such cases have presented themselves. Inflammation of the lung often also supervenes on this

[1] Since this paper was begun two nurses have had the fever, from causes unknown.

fever, and is mostly insidious in its approach; but the term of typhoid pneumonia I have never been reconciled to. The disease is either pneumonia in a typhoid condition, or typhoid fever with pneumonia added, but hardly seems to require a distinct name. We find pleurisy frequently mistaken for typhoid, and, sometimes, forms of nephritis.

The *age* of patients does not differ from the usual observations, people over 40 being less liable to this fever, because, for one reason, so many have had it once, even perhaps so mildly that it was not recognized; the ambulatory form being more common than is supposed.

In the 192 cases, DIARRHŒA is recorded in 31 per cent., and in nearly all the fatal ones; this is lower than foreign authorities give. It has doubtless happened in our patients before admission, but I certainly have been surprised at the number of cases I have seen, inside and outside the hospital, when this symptom never appeared.

VOMITING occurred in 20 per cent. of the cases, and has no special significance as an early sign; but when it comes on in the course of the fever it may be found to mean over-feeding, peritonitis, or nephritis. It is then dangerous, because it interferes with the patient's much-needed food.

COUGH was noticed in 28 per cent., the physical signs, if any, being those of bronchitis, excluding the pneumonias, pleurisies, and diseases of the heart. Delirium was present in 21 per cent., and in all the fatal cases.

ROSE-SPOTS are recorded in 47 per cent. (They have been observed in diphtheria, in non-febrile cases, and Jaccoud reports them in a case of acute tuberculosis.) Children and elderly people, as a rule, do not have them.

BLUE MACULÆ, *tâches bleuâtres*, were seen in five cases — one fatal.

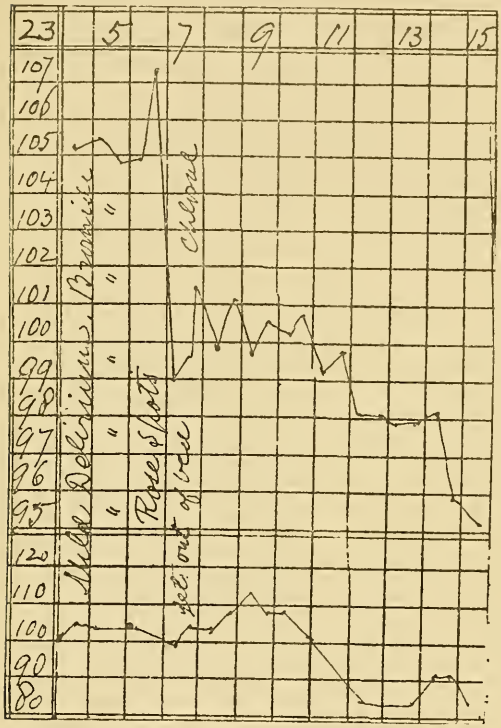
SWEATING in 7 per cent.

RACHITIC PAINS in 79 per cent.

EPISTAXIS in 23 per cent.

The highest pulse recorded in a case of recovery is 160 on the 14th day, the fever turning 8 days after.

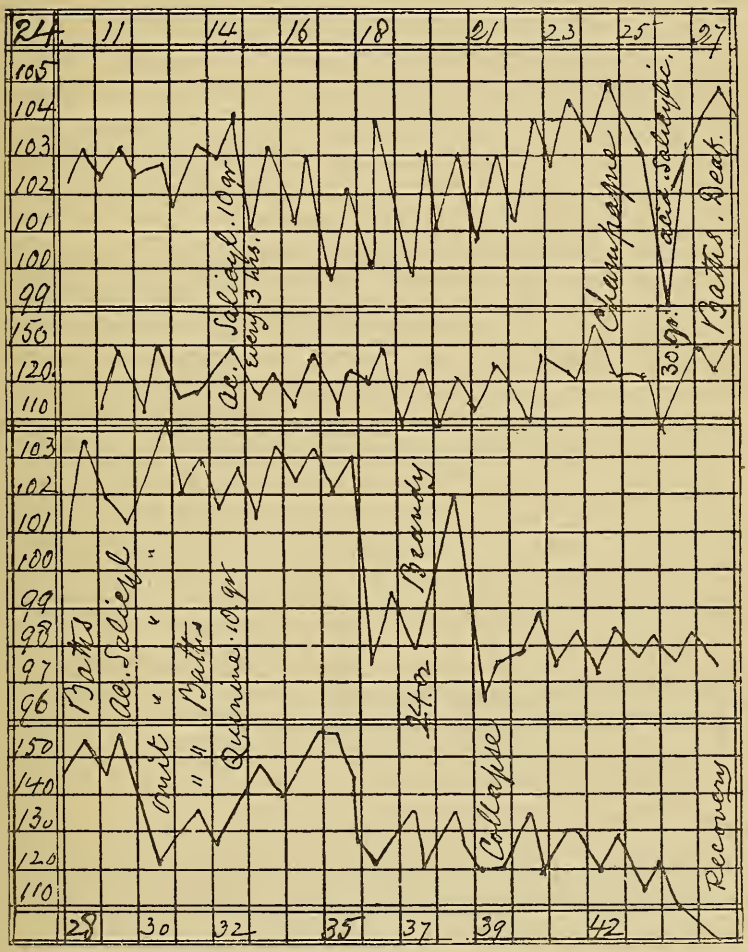
The highest temperature was in a man, aged 44, of 107° F., on the 11th day, when his pulse was 109, the fever abating on the 38th day. The usual termination of febrile action is known to be by gradual fall or lysis; but in a large majority of cases I remark that there is some day when the temperature drops two or three degrees to the normal; and in not a few of the charts may be seen a fall, which may be termed a defervescence or crisis, like the beginning of convalescence in pneumonia; in one severe case there was a fall of 8 degrees. Such a fall is shown, too, in Case 23, a private patient, May F., aged 17, where no antipyretic treatment had been adopted, on the 6th day. The frequency with which a long fall of temperature occurs in the course of a fever, without known cause, puts us on our guard against the belief that such a fall is always due to our remedies. Chart 24 shows this: Lizzie C., on the 26th day, had a fall of over 4 degrees after 30 grains of salicylic acid in two doses; on the 39th day a crisis took place, the temperature fell more than 5 degrees, with collapse, from which the patient was rallied with difficulty.



It is common to find in the milder cases the highest pulse and temperature on the day of admission, or on the day after; often the highest temperature on the day of admission and

the highest pulse the day after. This is owing to the moving and excitement of the patient, and is a marked proof, if one were needed, of the necessity for quiet in the treatment of fever.

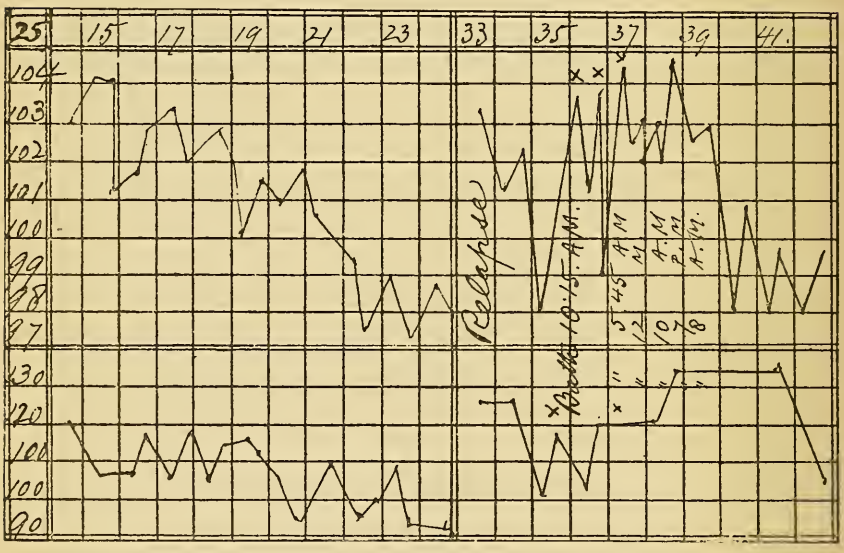
I have found the disease much more dangerous in an intellectual patient: professional men, and men in active business,



having a predominance of cerebral symptoms; particularly as they near middle life are the cases difficult to manage.

The deaths among 192 patients numbered 27, or 14 per cent.; the discrepancy between this table and that of all the

patients received in 10 years ($17\frac{9}{10}$ per cent.) is owing to the smaller number of observations, as the results would be nearly evened in the multiplication of cases. Again, the last quarter of the year, though furnishing most fever patients, is not the fatal season; as, in all epidemics, the worst comes first, and we notice that in the hotter months of July and August the cases, though fewer, are shorter and more intractable. Thus, in 1871, during a service of $4\frac{1}{2}$ months, from the middle of August, there were 8 deaths out of the 37 cases on the south side, of which 6 were between the 15th of August and the 1st of October. In 1874 there were 24 cases and 3 deaths, two in September and one on the 24th of October; but the term of service was only 8 weeks, from



September 15th to November 15th; after this date 11 more cases entered under Dr. Borland, and all of these recovered. In my service during the autumn of 1880 there were 28 admissions, 5 deaths and 7 relapses. Dr. Lyman found his service on the north side, at the same time, equally anxious.

It has been found so difficult to trace the number and history of *relapses*, that their consideration has to be postponed for the present. Before last year I had never seen a death from relapse of typhoid fever; but then, there were two

deaths, — one (Case 19) when hemorrhage had taken place, and one who was doing well, and his nurse reproached herself that the patient had seized on a large slice of bread and devoured it while her back was turned. Such errors in diet, early sitting up, and exposures are assigned as causes of relapse; but most of the returns of fever which I have observed have taken place without any such reason. The course of a relapse is milder, shorter, and more tractable than the original malady in nine cases out of ten.

Length of stay in the hospital is usually entered in tables of fever; but as it has been found in my own service that the stay ranges from 7 to 130 days, no real information is obtained by an average. Many are retained days and weeks after recovery because they have no homes to go to, and are of some use in doing light work about the wards. The fever may have as short a course as that of May F. (23), which was 13 days, or as short as 8 days.

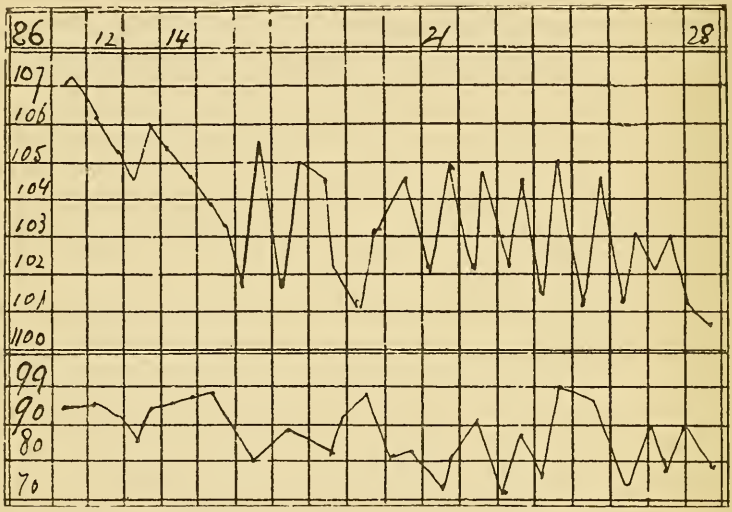
Perhaps the most interesting cases that have occurred are those of the H. family, noticed on the 39th page, where the autopsies of two are recorded; the remaining 5 recovered, and of these James, aged 16, reported that he returned well from a visit to Portland, 3 weeks before he was sent to the hospital; a week before, he had chillness, vomiting, headache, and tinnitus, and, later, diarrhœa. The liver was found to be enlarged, and below it a rounded tumor in the region of the gall-bladder, where only there was marked tenderness. The next day the pulse in the evening was 104; temperature, 104°, and respirations 36. Fourteen days after admission, the record runs: "The tenderness in the region of the gall-bladder is considerably diminished, but as others of the family have died with perforation of the gall-bladder, there is reason for anxiety." But the patient made a good recovery, and was discharged well. Similar cases are reported by Murchison (patient, aged 19), Barthez and Rilliet (aged 12), Budd, and others.

Six cases of intestinal hemorrhage are found in this series of cases, and 3 of these died. The case (19) of one is detailed on page 29.

The worst case of hemorrhage I have ever seen was in a

private patient, who was blanched and collapsed from loss of blood from the bowel, in the second week. She, however, made a good recovery.

The percentage of deaths from intestinal hemorrhages — 56 in the whole number of patients considered in this article — is larger than was supposed. Hemorrhages early in the disease are thought to be less dangerous than in later stages, but the gravity of the symptom is not to be doubted.



The temperature of the body in typhoid fever has come, since the general use of the clinical thermometer, to be the indication for treatment, diagnosis, and prognosis. For diagnosis it is invaluable. For guidance during the disease I rely on the pulse. In these 10 years the pulse has given the warning of approaching trouble, even when the temperature has signified nothing untoward. Patients die of typhoid with a slow pulse, but none of this series of 192 has done so, nor have I seen any other case become fatal with a slow pulse. A slow pulse with high temperature generally means meningitis. For a practical indication derived from individual experience I have to believe in the signals thrown out by the artery in the wrist above all. I have seen no patient die whose pulse has not reached 120, 24 or more hours before death. Patients come in unconscious, who can give no ac-

count of themselves, delirious, passing everything under them, with the thermometer in the axilla 105° F., with slight morning remissions; but if the pulse keeps at about 100 to 110 they do well. High morning temperatures are suspicious; but if they mean mischief the pulse creeps up with them. One who has seen much of the disease will anticipate a rise of the pulse as much from other signs as from the temperature. I am by no means depreciating the value of this indication, but am sure that students come to rely on it too much. The chart well prepared for the morning visit, with temperature, pulse, respirations, and dejections noted, gives assurance to the glance at a patient that is of inestimable usefulness, and saves a world of talk and time in the wards. A range of pulse from 120 upwards, it is needless to say, is often followed by recovery. In 1871, out of 29 cases of recovery, 7 had the pulse at 120 or more, for a greater or less time. In 1872, the temperature reached from 104° F. to 107° F. in 18 out of 23 recoveries; the highest pulse counted from 120 upwards in only 4 cases. The influence of certain conditions in raising the temperature and pulse at the beginning of convalescence is odd. Sitting up half an hour in one case raised the needle 3 or 4 degrees. Several patients have gone out well with a pulse at 120. One girl lived in a family where I was attending, and I had thus the advantage of watching her for some time. The symptom disappeared as she went on with her work.

In these 192 cases the treatment has not been the same, the use of stimulants being invariable in severe cases. In 1871, with its 37 patients and 8 deaths, hydrochloric acid was uniformly used, and to some extent in 1872, when cool sponging was employed, with 2 deaths out of 25 cases. In 1873, when there were no deaths in 13 cases, no fixed line of treatment was adopted, but sponge baths and stimuli in the worst cases. In 1874, the German plan of cold tub-baths was put in practice with some regularity, which, since the completion of the new wards, has been perfected. In 1874, there were 3 deaths out of 24 cases; in 1875, 4 deaths in 25; in 1876, 1 death in 13; in 1877, 1 death in 15. In these 4 years the mortality has been 11 + per cent. The two fatal cases

in 1876 and 1877 were moribund when admitted, though one lived mysteriously several days longer than was supposed possible. In the years 1871, 1872, 1873, there were 75 cases and 10 deaths, a percentage of $13\frac{1}{2}$. Three at least of this 10 could be fairly described as dying when they came in. In 1878, I had but 6 cases, all mild, requiring no treatment, except that one had tub-baths, and none died; in 1879, 14 cases and 3 deaths; in 1880, 28 cases and 5 deaths.

With regard to the use of *cathartics* it is noticeable that most patients who enter the hospital have been purged, very many in a drastic fashion, with no special untoward result.

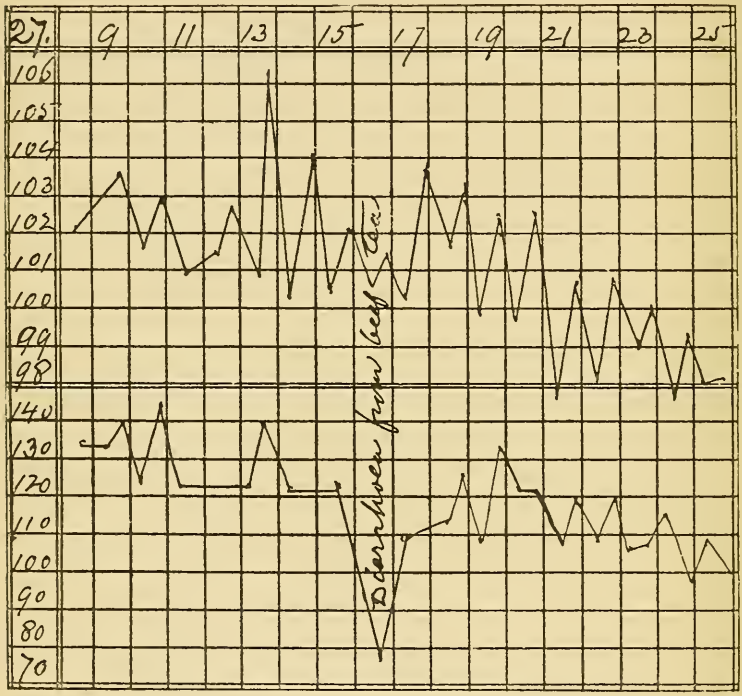
The use of *stimulants* is regulated by the state of the pulse; if the beats are growing in rapidity and losing in strength, if they near 120, a half ounce of spirits or a glass of champagne is given. If there be from any cause doubt of the need of alcohol in a rising pulse, the dose is given with the finger on the wrist, and the influence of the drug on the circulation marked. If the pulse steadies or slows, the wine is repeated on its rising. In Case 24, 24 ounces of brandy were swallowed daily for days together, during which time the girl's face did not flush, the eyes were not suffused, the speech thickened, the tongue loaded, nor the mind clouded. Some fever patients cannot be made drunk by all the alcohol you can pour into them, while others do not bear champagne in small doses. I know very well that 12 ounces of spirits daily is said to be all that the worst case needs, but this limit is constantly and necessarily exceeded with favorable results. As the fever abates the amount is gradually lessened. The reason hard-drinking like this does not make drunkards is, that patients so ill as to need this heroic stimulation have their senses so much blunted as not to know whether they are drinking brandy or beef-tea. When the need departs the natural indifference or distaste returns. A medical friend tells me that during his fever and convalescence he had a craving for alcohol that could hardly be satiated, and its use never affected his head. One day, on the return of health, he suddenly lost the morbid desire. Of course stimulus given when it is not needed has its usual effects. A girl was admitted one morning with high fever

and rose-spots, whose aspect and history did not agree with the extreme temperature and pulse. She had been treated with stimuli from the onset of the fever. All wine having been withdrawn, the pulse and temperature dropped at once to a range indicating a mild, though undoubted, course of fever.

Quinine and salicylic acid have been used with good effect to lower the temperature and pulse, of which, as you see in Chart 24, 20 grains of quinine or 30 grains of salicylic acid are given in 2 doses, the latter an hour before the usual time of rise of the thermometer and pulse. Either reduces the temperature 2 or 3 degrees and the pulse 5 or 10 beats, subtracting so much from the waste going on. I say no more of these drugs, the action of which has been demonstrated, but pass to the experience with the baths.

The tubs in the new wards of the City Hospital are so arranged that a walk round each is afforded, and the labor of giving a bath greatly simplified. The patient's bed can be brought alongside the tub; he is lowered on the sheet into the water, if he be feeble, with the minimum of exertion. The orders are to give a bath when the temperature reaches 103° F. and the pulse is above 110, the water to be at 100° F., and lowered by a bit of hose on the cold-water tap to 80° or 70° F.; ice may be used to effect this. Great caution must be used if the fever is two or more weeks old. If he shivers he is taken out and given half an ounce of brandy; if he does not, he is kept in 10 to 20 minutes, when his temperature will have dropped 2 or 3 degrees, or will do so in an hour after, and the pulse lowered some 10 beats. If the pulse does not come down, you may doubt if your baths are doing good; but if the patient enjoys them, as he often does, I have seen no harm follow. The febrile action will then begin to increase, and in 2 hours more another bath will be needed, and perhaps another. Some patients resist the baths so as to antagonize their benefit, when they are relinquished, and we have our alcohol to fall back on, with good results, as in Case 27. Alexander M., aged 12. This lad had typhoid fever, with

high delirium. He fought against baths, and was treated by stimulants; brandy, 12 ounces daily. Recovered, with contraction of right knee and elbow. Beef-tea, given on the 15th day, produced diarrhœa, which lowered the pulse from 120 to 76. He was 63 days in hospital.



I close by following the course of treatment after the admission of the patient, and getting his history, if it can be extracted from him or his friends. Perfect quiet is insisted on, and the least kneading of the abdomen, tapping at the chest, vexing with questions, changing of linen, and fussiness, that human nature will permit. In private practice the hardest thing is to get your patient let alone. (I have seen a patient with pneumonia killed in private practice by a premature shifting of bed and linen.) He is made to drink a cup of milk every two hours, if he knows enough to do it: if he does not, it is administered like medicine. And it may be here noticed how the attendants of patients

outside the hospital will faithfully exhibit drugs, and how carefully we have to impress upon their minds the superior claims of food. A mug of milk, which is generally drunk more readily if iced, stands by the bed, and thirst commonly induces the use of three or more pints daily. Some patients, mostly private patients, are averse to milk, which is made more palatable by the addition of Apollinaris or other gaseous waters. Others will take a gallon a day, and complain that they are starving. If our patient's pulse keeps below 120 nothing more may be needed, and, as shown in the first part of the paper, one-third of the cases have no other treatment. Besides the fact that beef-tea is generally ill made, and the certainty that it furnishes less nutriment than milk, — it does often create diarrhœa, — as is seen in Case 27, where the flux brought the pulse down from 120 to 76, increasing the prostration.

Diarrhœa requires, first, the bed-pan. It may seem trivial to mention this, but if one takes it for granted that the patient outside a hospital is using one, he may find that a dangerous waste of tissue and strength is going on from the patient's rising to use the vessel. The symptom should be controlled if it amounts to more than three operations daily — which is all I wish the patient to have — by the use of Harley's pill, of a grain of opium and a quarter of a grain of sulphate of copper, every second operation.

If the patient sleeps fairly, a mild delirium requires no treatment; if any is necessary, Graves's pill of opium and camphor is often serviceable; his prescription of opium and antimony for furious delirium I have used, but think baths and stimulus answer better. With delirium comes vigilance, which may be palliated by a sponge bath or a glass of wine, Dover's powder if the skin is very dry, 10 or 15 grains of chloral, or 40 grains of bromide of potassium. Fierce delirium sometimes requires restraint, and if baths and alcohol be not required by other symptoms, then 15 grains of chloral, with 30 or more of bromide of potassium, repeated every two hours, are frequently of use. I have had to attack intolerable headache, simulating meningitis, with a subcutaneous injection of one-third of a grain of morphia.

Temperature and pulse ascending, the baths, stimulus, salicylic acid, or quinine, come into play, according to circumstances and the physician's judgment.

Meteorism is exceedingly troublesome at times, for which I have used turpentine by the mouth and by rectum, with less satisfaction than authorities promise; its application as a stupe is quite as useful; its great advantage at the time when the tongue cleans in flakes I have not observed, because I have thought other stimulus more palatable and efficient. A typhoid patient requiring aspiration of abdominal gas is ordinarily too far gone, I suspect, for a favorable result; but the operation may afford comfort. If cough is annoying, and does not proceed from serious trouble in the lung, the cough mixture known as Dr. Bowditch's relieves it. For epistaxis in fever, I have had to plug the nares from behind twice in consultation, but not in hospital. As the patient convalesces he is allowed light puddings, next, soup and bread, when he begins to tease for food. If the temperature has dropped to normal for two days, with clean tongue and flat belly, and the pulse keeps up, it is the pulse of weakness, and calls for solid food and wine. A bit of steak given too early, sitting up too soon or a few minutes too long, may send temperature and pulse upwards, and to make haste slowly is the best policy. Aitken says that a soldier is not fit for duty under four months after an attack of typhoid fever. But our patients have to go to work much sooner than that.

Jürgensen by cold bathing at Keil reduced the rate of mortality from 15 to 3 per cent. Liebermeister from 16 to 9 per cent. Ziemssen and Immermann from 30 to 9 per cent. Brand reports 1,411 cases, with deaths at the rate of 4 per cent., and a series of 170 with no deaths, as the result of cold baths. Dr. Edes, who makes these quotations, records 66 cases (Boston City Hospital Reports, volume II.) with 11 deaths. To these I add 21 with 5 deaths, or 18 per cent. The practice has not commended itself to my other colleagues. The last two years I have given fewer baths, because the success has not been as great as was anticipated from the reports of the German physicians. I have not been persuaded

by my own experience with cold baths and antipyretic doses of quinine that they shorten or cure the disease, although they reduce temperature in a wonderful manner. The reduction of temperature is not all that is needed to curtail the disease. While patients die with no great elevations or high courses of temperature, and autopsies give no other cause of death than congestion or moderate ulceration of intestinal glands, it will be difficult to see how the amount of what we call "fever" decides the result. Although I continue to use cold baths and antipyretics in such cases as seem to demand their use, if I were restricted to one remedy and one drug in the treatment of typhoid fever, I should choose the sponge bath and brandy for my pharmacopœia.

TYPHUS FEVER.

The reappearance of typhus fever this spring gives interest to the statement that only two cases of that disease have been seen in the hospital in the last 10 years, both of whom recovered. In the 5 preceding years Dr. Upham recorded 38 cases and 10 deaths.

The two cases are annexed: —

(1.) XLIII, 147. *Typhus Fever. Recovery in 23 days.* — Angus M., admitted Feb. 15th, 1878. Sick for 13 days; head was hot and ached; pains all over; has been very weak; thirsty; anorexia; sleeps well; no cough; no epistaxis; condition of bowels not known; temperature 100.2°; pulse 104.

16th. A.M., P. 104; T. 102.5°. Countenance dull; face seems puffy; physical examination; apex systolic murmur.

17th. Takes nourishment well; back bathed with rum and water each day; remains stupid but answers rationally; passes urine in bed; gurgling in right iliac fossa; no dejection for 3 days; movement by enema; fæces hard; maculæ on skin that look like spots of dirty water.

20th. Does not pass water in bed.

March 1. Has been sitting up for some days; constantly asking for more food.

11th. Has been gaining steadily.

Discharged well.

(2.) CXXVI, 136. *Typhus Fever. Recovery in 16 days.* — Thomas H., admitted June 14th, 1876. Family history obscure; 6 days ago was attacked with headache, pain in bones; next day was confined in bed, was very thirsty, anorexia; since, some diarrhœa; no epistaxis; restless at night. Patient very stupid and history obtained with considerable difficulty; expression dull; is markedly deaf; answers questions badly; tongue coated, yellowish, dry on tip; skin hot; temperature 103.4°; pulse full, bounding, 120; flesh tender on deep pressure; a bright red eruption all over body, disappearing momentarily on pressure, more thickly spread on arms and legs; abdomen moderately distended, tympanitic, tender on pressure, gurgling; sponge bath every hour (4 or 5 given).

15th. Four loose dejections since entrance; 4 or 5 sponge baths and same number of tub-baths given during 24 hours.

16th. Three dejections past 24 hours.

17th. Good deal of mottling over body and hands, besides pink spots not so distinct or raised as the usual rose-spots of typhoid; 4 dejections past 24 hours.

18th. Three dejections last night; countenance brighter; answers questions more readily.

19th. Until last night has slept nearly all the time, or in a drowsy condition; has slight cough; omit tub-bath.

20th. Five dejections last 24 hours; sponge bath every 2 hours; red spots nearly, but not quite, disappeared, but mottling remains nearly same.

July 4th. Patient entirely convalescent.

10th. Discharged well.

A SYNOPSIS OF FIFTY MEDICO-LEGAL AUTOPSIES.

By F. W. Draper, M.D.

The following notes illustrate a new department of work at the hospital. Before July, 1877, the records of post-mortem examinations in cases of death by violence or under suspicious circumstances were rarely available for any useful purpose after the coroner, under whose authority they were made, had decided that he had no further use for them at the inquest. Moreover, each of the forty-six coroners holding commission in this single County of Suffolk had his own favorite "annex"-physician to do his pathological work. This arrangement necessarily precluded uniformity and system in the methods of observation as well as anything like instructive analysis and comparison. But the method now in force in Massachusetts with regard to the investigation of violent deaths has changed all this. Whatever its other advantages may be, it is certainly fruitful of good results in one direction, at least: it affords opportunity for a select number of men to become reliable and experienced as medico-legal inspectors, and, at the same time, it offers much excellent material for practical instruction in forensic medicine, — a branch of medical science hitherto greatly neglected in American medical schools. The two medical examiners under State commission in this county are under the necessity of ascertaining the cause of death in numerous instances of fatality, constantly occurring as the result of casualty and crime in a densely populated section containing more than four hundred thousand inhabitants. This obligation implies the frequency of autopsies as an essential means of investigation, and the following notes are offered as an example of this work, representing partially and inadequately the variety and extent of the medico-legal experience which falls to the medical examiner.

It may be asked very properly how these notes are appro-

priate in a work relating to the City Hospital of Boston. The answer is, that many of the cases here mentioned were cases under treatment in the hospital wards before they became the subject of post-mortem judicial inquiry. A great general hospital must inevitably receive among its patients many persons injured through the agency or negligence of others, and, if these injuries are fatal, they become the subject of legal investigation; hence a considerable proportion of the deaths by violence in the city actually occur in the wards of the City Hospital, and become a part of its medical and surgical history, although the violence itself was inflicted in various parts of the city, more or less remote. Moreover, it has been the writer's good fortune, through the courtesy of the hospital administration and of the hospital pathologist, Dr. Cutler, to have the privileges of the autopsy-room freely extended to him at all times. This has greatly facilitated the operative work in connection with the medical examinations required in the southern section of the county. The dead bodies of strangers recovered from the water, or found within the county limits under conditions that prevented ready identification, have been removed at once to the mortuary, which is in the same building with the hospital dead-room. If circumstances required an autopsy in these cases, it was made in the hospital anatomical room, provided with all needed appliances and instruments for the convenient performance of the work. In many cases, too, of death by violence, occurring at the homes of the victims, the bodies have been removed to the hospital, for more careful and precise examination than would be practicable in a private dwelling. It has thus happened that most of the medico-legal autopsies performed by the writer during the last four years have been really under the auspices of the hospital, enlarging its scope of proper usefulness, furnishing to its records a new department of scientific interest, and supplying in an available form much material for practical instruction in forensic medicine to the senior class of medical students.

Each one of the groups of cases here offered presents a tempting theme for special and extended comment; indeed,

each individual case has some features which distinguish it from its fellows of the same class. It would be interesting to analyze these peculiarities; to study them with relation to the latest advances in legal medicine and pathology; to show their legitimate connection with the established principles of science, of which they are the illustrations, and to compare them with similar cases by other observers. To do this, however, with anything like satisfactory thoroughness, would far transcend the prescribed limits of the writer's contribution to this report. The cases are given, therefore, in their present shape, without note or comment, and shorn of all details out of direct connection with the immediate pathological or anatomical fact, or medico-legal rule, which they are designed to exemplify. They are offered in the hope that they will serve their purpose, by interesting the general medical reader, and by being of use to those who are more or less devoted to the special department of legal medicine.

CASES OF ABORTION.

I. A young woman, aged 26, of good social position, left her home in an interior town, Feb. 8th, "to visit friends." Feb. 9th she applied for admission at a private lying-in house in Boston. She was cared for here by the woman in charge till Feb. 16th, when a regular physician was called; to him the patient stated that she had "operated on herself with a bent tube, Feb. 8th, when she was four months pregnant." She sank rapidly, and died Feb. 18th.

Symptoms. — Nothing satisfactory was learned concerning these up to the time when the physician saw the patient, two days before her death; at that time there was fully developed general peritonitis. He removed a portion of a decomposed placenta from the vagina; the great tenderness and low condition forbade further interference.

Post-mortem Appearances. — Breasts fully developed; no pigmentation of areolæ. Dark, fetid, vaginal discharge. General acute peritonitis; eight fluid-ounces of thin, offensive pus in peritoneal cavity; intestinal folds agglutinated. Spleen large and pale. Uterine cavity measured three and

three-quarters inches in depth; wall of womb eleven-sixteenths of an inch thick. Attached to the inferior zone on the right side was a mass of decomposed placenta, firmly adherent to the uterine wall over a space one and one-half inches in diameter; section through this mass and through the uterine tissue showed the two to be continuous, the sinuses being distinctly marked. The right ovary contained a corpus luteum three-fourths of an inch in diameter, with a well-defined yellow convoluted wall, and a central decolorized clot.

II. Being illegitimately pregnant, this woman, 27 years old, consulted an irregular practitioner with reference to a "tumor" in the abdomen. She denied to him that she was pregnant, but permitted him to use in her vagina "a long thing like a wire and long-handled scissors, which left her very sore." This produced no result, and after a few days she saw him again at his office, where he etherized her, and, according to his own statement, simply extracted the contents of three hemorrhoids, by means of a large hollow needle attached to a brass ear-syringe, first enclosing the neck of the hemorrhoid with a rubber band.

Symptoms. — On recovering from the ether, the woman found herself losing water from her vagina in considerable quantity. Labor pains came on after four or five hours, and continued twenty-four hours, when a physician was called, who delivered a living six-months' fœtus. The woman did well a few days, when, after exposure, she had a chill and was admitted to the hospital with septicæmia fully developed, — fever, chills, abscesses, a sallow skin, etc. She died eighteen days after the labor, and nineteen days after the surgical operation.

Post-mortem appearances. — The skin was rough and dry, and of a uniform sallow hue. Bullæ on both shins. Peritoneal cavity contained three fluid-ounces of red fluid. Spleen weighed one pound three ounces. Kidneys weighed six ounces and five ounces respectively; cortex thin, yellow, opaque. Uterus and ovaries weighed fifteen ounces. Length of cavity, two and a quarter inches. Os uteri patulous. The mucous membrane of the cavity was covered with a thick,

reddish-brown, semi-fluid matter. The muscular tissue of the uterine wall was friable, one inch thick at the thickest; well-marked ecchymoses in the cervical portion. In the connective tissue in front of and behind the uterus were purulent collections; also along the ulnar border of the left forearm, and in the left thigh. The right ovary was normal; the left ovary was not found; its place was occupied by an abscess containing six drachms of pus. No abscesses in lungs, liver or kidneys.

III. Deceased (aged 22) lived at the house of an "herb-doctor," as lodger, servant, and patient, in one. She confessed to this man, and to others, her seduction and pregnancy, and urged him to relieve her of her condition. This relief, he declared, he refused to bestow, but he acknowledged that he attended her when she gave birth, June 27th, to an immature fœtus. She did well till June 30th, when she began to grow worse, and her death occurred July 2d.

Symptoms were not satisfactorily determined, the "herb-doctor" being her only attendant. The pregnancy was supposed to have reached the fifth month.

Post-mortem Appearances. — Breasts full; colostrum in nipples; areolæ dark-colored. No lineæ albicantes. Peritonitis limited to pelvis, where there were two and a half fluid-ounces of thin, light-green pus, with slightly fetid odor. Vagina relaxed; rugæ obliterated. Dark-brown, foul-smelling lochia. Labia and perineum normal. Os widely patulous. Cervix showed a slight ragged erosion posteriorly. Placental site three inches in diameter near fundus, posterior. Size of uterus that of a large orange. At the right of the os was a small bleb-like projection, which admitted a probe to a minute, straight track in the uterine wall, containing pus; the wound of exit was on the posterior surface of the womb just to the right of the middle line, two and seven-eighths inches from the wound of entrance. There was a corpus luteum in the left ovary.

IV. The statement made by this woman, and by her husband, was to the effect that on December 2d she had been

in the office of a well-known abortionist, who had there used a syringe in her vagina; that the same evening she had had pains, and had miscarried. December 9th she called a physician, who found her suffering from general peritonitis. The abortion was procured simply to gratify the woman's desire to avoid the birth and care of children. The patient was 24 years old, and was in the third month of her pregnancy. The usual symptoms of acute peritonitis were fully developed. Vaginal examination found the os uteri patulous, hot, and tender; the vagina was smeared with a foul lochial discharge. Death occurred December 13th, eleven days after the abortion.

Post-mortem Appearances. — The autopsy was made six days after the death, the body having been disinterred for the purpose. Cadaveric rigidity had disappeared. The vulva was relaxed, showing a widely open ostium vaginæ, from which exuded a dark-brown lochial discharge. No sign of violence about the genitals. There was general acute peritonitis, with extensive agglutination of the intestines and accumulation of pus in depending parts. Spleen of normal size; kidneys altered by decomposition. The uterus was enlarged; its long diameter was four inches, and its weight, with ovaries and rectum, one pound and four ounces. The os uteri freely admitted the finger. At the left margin of the os was a laceration a quarter of an inch long and one-sixteenth deep, opening into the cervical canal; its edges were sloughy. The uterine wall measured five-eighths of an inch. There was left salpingitis. The left ovary contained a corpus luteum. The placental site was on the posterior wall of the fundus; it measured two by two and a-half inches, and was raised and sloughy.

V. By the confession of the deceased to her nurse just before death at the hospital, it appeared that she had been operated upon five days before by a professional abortionist, to get rid of an illegitimate offspring. There were great pain and hemorrhage, followed by faintness, at this time. The abortionist took her to another place to convalesce. In about two days she began to be worse, and she was sent away, lest

she should die at the house of the accomplice. She went to a relative's, and thence to the hospital, where she gave a false account of herself, alleging that she had been injured in a runaway accident. She was 22 years old, and her pregnancy was in the third month.

Symptoms. — At the time of the abortionist's operation the patient suffered much pain, flowed freely, and was faint. She did not know the precise details of the operation; but said the man inserted an instrument into her vagina. After forty-eight hours, chills, pain and abdominal tenderness developed. In the hospital she had the characteristic signs and symptoms of pelvic peritonitis, and was treated accordingly. She sank, and died about twenty-four hours after her admission.

Post-mortem Appearances. — Breasts fully developed. No areolar pigmentation. Vulva normal. No vaginal discharge. Acute general peritonitis; sixteen fluid-ounces of fetid pus among the agglutinated intestinal folds. Uterus measured four inches from os to fundus. It presented no appearance of violence. The os admitted the little finger. Placental site was at the fundus, on the posterior wall, one and a half inches in diameter, and projecting as a sloughy mass into the cavity a quarter of an inch. The uterine wall was pale, firm, and but slightly thicker than that of an unimpregnated womb. The Fallopian tubes and ovaries were crowded down behind the uterus, where they were held by inflammatory adhesions. There was double salpingitis, the Fallopian tubes being distended to the size of a goose-quill, and filled with pus, the lining membrane being injected, purple in color, and thickened. The right ovary contained a corpus luteum of the size of a large filbert, the convoluted yellow wall being distinct, and the central cavity containing clear fluid.

DEATHS BY DROWNING.

I. The body was that of a woman, about 20 years old; it was found at low tide in a dock. Identity, previous history, and manner of coming to her death could not be determined.

External Appearances. — Face, scalp, and neck of a uniform port-wine color; skin elsewhere of normal, waxy, pale color. Eyes prominent; conjunctivæ suffused; corneæ dull and flaccid. Teeth firmly apposed; gums bright red; tongue in normal position. Lather-like froth at mouth and nostrils. Cutis anserina in moderate degree. Very slight cadaveric lividity below clavicles. Hands firmly closed, the thumb in the palm.

Internal Appearances. — Pulmonary artery, venæ cavæ and right cavities of the heart engorged with dark, almost black, blood, of fluid consistency, without any clots. Aorta and left cavities of the heart empty, the left ventricle firmly contracted. Lungs fully expanded, pressing closely against the ribs; light-red in color anteriorly, darker posteriorly. On section, uniform hyperæmia was observed; lungs dense, slightly crepitant, exuding blood and froth from cut surface. Bronchi, trachea, and larynx contained fine froth of a pink tinge, and their mucous membrane was fully injected. The peritoneum, kidneys, spleen, liver, and intestines were engorged. The stomach contained four fluid-ounces of thick brown fluid, with masses of half-digested food scattered through it; the gastric mucous membrane was uniformly reddened; the muscular wall was thrown into numerous ridges or rugae. General hyperæmia of brain and its meninges.

II. Male, aged 37. Drowned while bathing. Body recovered within three hours.

External Appearances. — Very slight lividity about the back of the neck; skin elsewhere of a natural color. No cutis anserina. Conjunctivæ slightly injected. Mouth open; tongue behind teeth; fine froth over lips.

Internal Appearances. — Lungs very fully distended, of a pale grayish-pink color, with many well-defined sub-pleural ecchymoses. On section, much frothy fluid escaped. Cut surface pink in color. Bronchi contained froth and water, and the mucous membrane was injected. The tracheal mucous membrane was also much reddened, and there were froth and a little food in the larynx. The heart was moderately

distended (not engorged) with dark, fluid blood in its right cavities; left side firmly contracted. Abdominal veins engorged. Kidneys and liver hyperæmic, but not extremely so. Stomach contained a quantity of half-digested food, but no appreciable amount of fluid. Brain and its membranes injected.

III. Male, aged 35. Accidentally fell overboard from a wharf. Body recovered within an hour.

External Appearances. — Froth at mouth and nostrils, of a red tinge. Teeth apposed, and tongue in normal position. Eyes prominent; conjunctivæ suffused, with a dirty reddish-brown appearance in corneæ. Skin of face and neck of a dark-purple color; skin elsewhere white. No cutis anserina. Although the body was in the water less than an hour, the lobule and posterior edge of the right ear showed the marks of fishes' teeth.

Internal Appearances. — Heart's right cavities engorged with dark (nearly black) fluid blood, with a single imperfectly formed shreddy clot in right ventricle. Left ventricle contracted and empty. Lungs fully expanded; pitted on pressure. On section, blood and froth exuded freely. Color of cut surface pinkish-gray. Bronchi and trachea held much fine, lather-like froth, and their mucous membrane was injected. No sub-pleural or sub-pericardial ecchymoses, or emphysematous appearance on surface of lungs. Kidneys, liver and spleen engorged. Stomach contained a pint and a half of partially digested food, without any noteworthy amount of fluid. Hyperæmia of meninges and of brain.

IV. Female, aged 40. Accidentally drowned. Body in the water twenty-four hours. Identified by means of a piece of hospital *emplastrum belladonnæ* worn on the side of the thorax.

External Appearances. — Skin of the head and face turgid and of a dark-purple color. Lips and gums engorged; fine froth of a pink tinge over lips. Skin uniformly white in every part below clavicles; very slight cutis anserina; conjunctivæ injected. Tongue in natural position.

Internal Appearances. — Heart's right cavities relaxed (brain examined first); left ventricle firmly contracted. Blood, liquid and dark. Lungs fully distended, with rounded edges, covering pericardium and meeting in the middle line; color of a purple plum; emphysematous appearance on lung surface. No sub-pleural ecchymoses. Section showed full hyperæmia in all parts of lungs. Bronchi contained abundant fine froth, slightly tinged; mucous membrane injected. Kidneys, spleen and liver injected. Stomach contained less than an ounce of viscid mucus; no food or liquid. Brain fully injected.

V. Male, aged 23. Walked overboard while intoxicated; breathed and moaned a few times after recovery from the water.

External Appearances. — Cutis anserina distinct; skin very thin and tearing easily. A slight discharge of bloody fluid from the nose. No froth at nostrils or lips. Teeth apposed and tongue in natural position. Very slight lividity in any part; face rather pale than otherwise; lips of natural color.

Internal Appearances. — Heart firmly contracted on left side and nearly empty; right cavities fully distended with mingled fluid and clotted blood of a dark color. Neither lung expanded to an unusual degree; the left lung held by quite general old pleuritic adhesions. A display of typical sub-pleural ecchymoses on anterior and posterior surface of right lung; a small apoplectic nodule in the upper margin of the left lower lobe. Moderate hyperæmia of both lungs on section, without œdema. Bronchi contained some coarse froth, and their mucous membrane was reddened. Kidneys, spleen, liver and mesentery fully injected. Stomach contained eight fluid-ounces of thin, muddy-looking fluid, with a muddy sediment; stomach, before incision, fully distended with air or gas without odor. Brain not specially injected.

VI. Male, aged 36. Suicide in the underground cistern of a brewery, in consequence of jealousy. The body was recovered forty hours after the supposed hour of drowning, the delay being due in part to the inaccessibility of the cis-

tern. The deceased had jumped into the water through a small hoistway, a distance of twenty-nine feet.

External Appearances.— Patches of rosy, cadaveric lividity on anterior as well as posterior parts of body. "Goose-skin" well marked. Palms blanched. Eyes lustreless. Mouth closed; tongue behind teeth. A small amount of fine froth over lips, of a pink color. Face swollen and livid.

Internal Appearances. — Heart firmly contracted on left side; right cavities filled with fluid blood of a prune-juice color. Superficial vessels of heart engorged. Lungs fully inflated; color, a purplish-gray; fine vesicles fully distended at surface of lung. No sub-pleural ecchymoses. Uniform engorgement displayed on section; no œdema. Bronchi, trachea, and larynx contained much froth, and their lining membrane was much reddened. Six fluid-ounces of thin reddish fluid in right pleural cavity. Kidneys engorged. Spleen, intestines and liver normal. Stomach moderately inflated; with seven fluid-ounces of thin straw-colored fluid, containing small masses of partly digested food floating in it. The brain was normal in appearance, without noteworthy increase of blood supply.

DEATH BY STRANGULATION.

I. Deceased, L., was last seen alive Feb. 12th, 1880, in his room, in the early part of the evening, with his room-mate, M.; both men were burglars by occupation. M. disappeared that evening. Feb. 21st the landlord forced the door of the room which had been occupied by the two men, and found the dead body of L. lying in an easy attitude upon its back on the floor. The left hand held a pistol, one chamber of which had been fired, the rest being charged; this hand rested on a clean handkerchief placed upon the breast. The clothing showed a few spots of blood upon its upper parts. The head lay in a mass of dried blood, which was the only considerable collection of blood in any part of the room; there were a few small drops near the feet of the body and six small smears on the inner side of the closet door on the side of the room opposite to that

where the body lay. The furniture of the room was in order and gave no evidence of a disturbance in the premises. On a small table at the side of the room near the feet of the body was a piece of brown paper, on which was written a message purporting to have been prepared by the deceased and explaining his death as by suicide; the handwriting of this note bore many resemblances to the handwriting of the room-mate, M. In the wall of the room, seven feet above the floor, and directly over the head of the body, was an indentation in the plastering of the size and shape of a pistol-bullet; a bullet was found on the floor of room, corresponding in calibre with the bullets remaining in the pistol.

External Appearances. — The autopsy was made Feb. 22d. There was some rigidity remaining in the lower extremities; elsewhere it had disappeared. Post-mortem discoloration of a brownish-red over upper part of face; green over left cheek and left side of neck; green over entire abdomen; arborescent streaks (superficial veins) over front of neck and upper part of chest. Skin of face thickly smeared with blood-stains and spatters. Left side of face and neck much swollen, giving an appearance like mumps to that side. On the left side of the neck, immediately below the ear, were two superficial excoriations of the skin, each of the size of the little finger-nail; they were close together. On the right side of the neck, immediately below the angle of the jaw, the skin showed a discoloration darker than the surrounding discoloration of decomposition; this spot was oval in shape, darkest at its posterior extremity, and its diameters were one inch by one inch and a half. The mouth was partially filled with decomposing fluid blood. A pistol-shot wound penetrated the cavity of the mouth, the missile entering one inch below the left ear and one and one-eighth inches behind the jaw, taking a direction inward and downward, tearing through the substance of the tongue and emerging through the lower jaw and right cheek, fracturing the jaw from the last molar tooth downward and forward to the symphysis. [Dissection demonstrated that all large vessels had escaped injury in this wound.]

Internal Appearances. — The heart was softened, relaxed,

and empty; its endocardium was deeply stained, of a dark-red color; its structure was healthy. Both lungs were redder than natural in their upper and anterior parts, on section; decidedly injected, and œdematous and of a dark-red color throughout their inferior and posterior portions. There was no blood in the air-passages. The mucous membrane of the larynx, trachea, and bronchi was deeply stained of a cherry-red. The kidneys, spleen, liver, intestines, and stomach were free from indications of disease; the stomach contained a quantity of food taken a short time before death; there was no blood or other fluid in the cavity of the stomach. The skull was uninjured. The vessels of the meninges were fully injected with fluid blood. The brain was softened by beginning decomposition; there was no sign of disease in its substance or its cavities. The subcutaneous tissues on the left (swollen) side of the face and neck were infiltrated with liquid blood. The tissues under the ecchymosis on the right side of the neck were also infiltrated with blood. No blood-clots were found in any part of the body.

DEATH BY SUFFOCATION AND SMOTHERING.

I. Male, aged 3 weeks, overlaid. The child, born at eighth month, and weak from birth, slept with his mother. In the morning of January 11th, 1879, the child was found dead by his mother's side. She confessed that she was a heavy sleeper and had not been disturbed by her baby in the night.

External Appearances. — Rigor mortis well-marked. Cadaveric lividity of dependent parts. No marks of violence.

Internal Appearances. — Lungs injected, the right more than the left, being firm, dark-red and only moderately crepitant. Punctate sub-pleural ecchymoses, a score or more in number, under pulmonary pleura; none on the thymus gland. Heart filled with dark clots; three ecchymoses of the size of a split pea under pericardium of ascending portion of aortic arch. Foramen ovale open. Nothing noteworthy about brain or abdominal organs.

II. Female, new-born, smothered. This child was the unwelcome fruit of an unhappy marriage, the wedding having

occurred two months before the child's birth and after the mother had sought relief from her pregnancy by an attempt at criminal abortion. The day after the birth the mother took the child into bed with her and covered her with so many bedclothes that suffocation resulted.

External Appearances. — Of normal size, weight and development for a new-born child. Except in the deep folds of the chin, the elbow and the groins, the skin in all parts of the body was of the color of a damson plum; the lips were especially livid. The tongue was engaged between the gums.

Internal Appearances. — The lungs were uniformly engorged. There were numerous well-marked sub-pleural ecchymoses, especially distinct in the fissures; two small ecchymoses on thymus gland; four of medium size on the pericardium. Heart full of fluid blood; foramen ovale patent. Liver and kidney engorged. Two small ecchymoses under the scalp in frontal region; the scalp elsewhere showed a faint discoloration, attributable to the labor.

III. A chronic inebriate smothered in a pillow while intoxicated and helpless.

External Appearances. — The body was found lying on a bed, prone, with the face buried in a pillow, and a small stain of red (bloody?) fluid on the pillow at the right corner of the mouth. Rigor mortis was pronounced even while the body was still warm. The dependent (anterior) parts of the body were of a deep livid hue, the face and neck especially so. The tongue was behind the teeth. Eyes bright; pupils three mm. in diameter.

Internal Appearances. — The right cavities of the heart were distended with dark, liquid blood; the left ventricle was empty and firmly contracted. The superficial vessels of the heart were prominent and full; its muscular tissue was friable; the wall of the left ventricle was thickened to a moderate degree. The aortic valves were thickened moderately, and the mitral valve was incompetent. Both lungs were uniformly and universally engorged. The mucous membrane of the bronchi was injected and covered with a

thin layer of bloody mucus. There were a few ill-defined sub-pleural ecchymoses in the fissures of the lungs. The liver was cirrhosed. The mucous membrane of the stomach was uniformly injected, and the contents had a marked alcoholic odor. Meninges and brain not specially hyperæmic.

IV. *Asphyxia in a burning Building.* — Deceased, a man 45 years old, occupied a room on the upper floor of a four-storied building. At 5 A.M., Jan. 20th, 1878, the building was found to be on fire in the second story; on inspection after the fire it was found that the damage was limited almost wholly to this second story; elsewhere there was an abundant deposit of sticky soot, with an odor of illuminating gas. All the tips had been removed from the gas-fixtures on the second story, and the stopcocks had been turned so that, before the fire, the gas had escaped in full force. The dead body of Y. was found lying prone across the threshold of his room. The deposit of soot in the entry-way and rooms of this fourth story was particularly noticeable.

External Appearances. — The body was partially clothed, and the portions of clothing in place had evidently been arranged hastily. All the exposed parts of the body, as well as the clothing, were thickly smutted with tenacious soot. No sign of burns about the body. There were patches of pink, cadaveric lividity on the anterior as well as the posterior parts of the body. The jaws were firmly apposed, and the tongue was behind the teeth; there was no froth at the lips or nostrils. Rigor mortis was unusually pronounced. The autopsy was made twenty-nine hours after the death, supposing the death to have occurred at about the time of the discovery of the fire.

Internal Appearances. — The muscles were of a bright, florid, vermilion color. The heart was fully distended on its right side, empty and contracted on the left side; its color was bright red. The blood throughout the body was uniformly fluid in consistency, and of a bright, lobster-red color. The lungs were of a pinkish-gray color externally, with many well-marked sub-pleural ecchymoses; on section

they appeared engorged, of a brilliant red color, with only moderate crepitation. The trachea, larynx, and bronchi contained coarse mucous froth, abundantly colored with soot; the mucous membrane of the air-passages was injected. There was engorgement of the vessels of the peritoneum, kidneys, spleen, liver, and stomach. The intestines presented various degrees of hyperæmia, from uniform pink staining to distinct submucous extravasations. The vessels of the dura mater and of the vascular meninges were distended with bright-red fluid blood, and the puncta cruenta on a cut section of the brain were abundant.

V. *Asphyxia in a burning Building.*—Deceased, a woman of 35 years, was a cook in a lodging-house. Fire broke out behind the stairs, in a lower entry, at 1.20 A.M. All the inmates of the house escaped except Mary G., who had a room in the attic. After the fire her dead body was found lying face downward on her bed, her left hand over her mouth, her head buried in a pillow.

External Appearances.— The body was inspected ten hours after the death. The soft parts of the back, legs, and feet, were deeply charred; the calves had burst open; the hair was all burned from the scalp. The front of the body, having been protected by the bedding, showed only the primary lesions of burns. The tongue protruded from the mouth, and was bitten on the upper surface and much swollen. The lips were everted. The buccal mucous membrane was of a rosy color and fully injected. Dark-red, dirty-looking fluid escaped from the corners of the mouth, and there was fine froth at the nostrils.

Internal Appearances. — The muscles presented a bright, fresh, rosy appearance. The heart was engorged on its right side, the left ventricle being empty and firmly contracted. The blood was fluid, and of the color of carmine ink. The lungs were fully inflated. Their color was reddish-gray externally; a brighter red on section. There were many subpleural ecchymoses, most marked in the fissures. The bronchi contained, down to their smallest branches, mucus and soot intimately mingled; the mucous membrane was red-

dened. The trachea and larynx showed numerous small points of submucous extravasation; the epiglottis was erect. The kidneys, spleen, and liver were engorged with blood. The duodenum was the only part of the intestines particularly hyperæmic. The uterine wall was injected, and its lining membrane was smeared with blood.

VI. *Asphyxia in a burning Building.*— This woman, aged 67, and her grandchild, perished in a chamber of a dwelling-house that was on fire in its lower story; the smoke was abundant, but the fire was confined to the lower rooms. After the fire was controlled, Dora O. and her grandson were found lying dead together on the floor of their chamber, near the door.

External Appearances. — The body was partially clothed; the parts that were uncovered showed limited vesication; but the clothing was not scorched, nor was the hair singed. The mouth was closed, and the tongue was behind the teeth. There were a few faint rosy patches on each loin, and on the arms.

Internal Appearances. — The heart was engorged on its right side, empty and contracted on its left. The blood was fluid, and of a bright, florid color. The lungs were fully expanded, and did not recede when the sternum was lifted; their surface was emphysematous; injection moderate; no sub-pleural ecchymoses observed. Bronchi, to smallest branches, contained mingled soot and mucus, and the mucous membrane was reddened. The abdominal viscera were moderately injected. The meninges and brain were much injected, the vessels being fully distended. All the muscles were bright-red in color.

VII. *Asphyxia in a burning Building.* — A three-story wooden tenement-house, containing four families, and unprovided with proper fire-escapes, was set on fire at midnight, Sept. 17, 1879; five lives were lost, one by a fall from the roof, the others by suffocation, or in consequence of burns. Rosa M., 16 years old, the subject chosen for purposes of inquest, was in a chamber on the second floor, and her body

was found after the fire on the floor of her room, less burned than those of her neighbors.

External Appearances. — Autopsy fourteen hours post mortem. Rigor mortis, moderate. Cadaveric lividity of a pink color, chiefly marked upon the back. The skin showed the effects of burn in various places, in degrees varying from mere redness to extensive vesication. Mouth closed; lips swollen; tip of tongue between teeth. Hair of head and pubes dry, but not singed.

Internal Appearances. — Muscles of a fresh vermilion color. Heart distended on right side; empty and contracted on left. Blood fluid and bright-red in color. Lungs not notably expanded; of a fresh, pinkish-gray color externally, bright-red on section; fully engorged; a few sub-pleural ecchymoses in the fissures. Bronchi contained mingled soot and mucus, and the mucous membrane was deeply injected. The vessels of the omentum and mesentery were fully engorged, and the solid viscera were loaded with blood. The stomach was distended with air, and there were shreds of mucus stained with soot attached to the gastric mucous membrane. The larynx and trachea were deeply injected and contained soot. The brain and its membranes were hyperæmic.

VIII. *Asphyxia in a Lime-kiln.* — The dead body of this man (aged about 35) was found lying on top of the kiln early in the morning; it lay on the partition walls between two of the fires. The kiln consisted of four furnaces, shaped like an inverted cone; fuel and oyster-shells were heaped in alternate layers upon these blasts, and they were left over night in process of slow combustion. The top of the kiln was easily accessible, and offered a tempting resort to "tramps" to pass the night in a warm retreat.

External Appearances. — Autopsy the day following the finding of the body. The skin on the left side of the face was of a dark-red color, and hardened like leather or horn. The hair was easily pulled from the scalp, but was not burned or singed. The right hand was thoroughly charred. The epidermis upon the forearm was not blistered, but was very easily detached by passing the finger over it. There was no

vesication on any part, the tissues, where altered at all, being baked or desiccated. A disgusting odor of burned flesh pervaded the body. The teeth were apposed.

Internal Appearances. — The subcutaneous tissues were of a bright-red color. Both auricles and the right ventricle of the heart were engorged; the left ventricle was contracted. The blood resembled carmine ink in color and fluidity. The lungs were uniformly, but not extremely, hyperæmic. The color externally was pinkish-gray; internally, a uniform vermilion. There were a few punctate ecchymoses under the pleura. The bronchial mucous membrane was injected. The omentum, mesentery, kidneys, and intestines were engorged with blood, presenting a most striking appearance on account of the brilliant color of the blood; the hyperæmia of the intestinal mucous membrane was very marked. The spleen and liver preserved their normal appearances. The meninges and brain substance were injected with blood. The left frontal lobe of the cerebrum was literally baked, being softened in consistence, and of a pale-gray color.

IX. *Asphyxia in a Lime-kiln.* — The body of James McM., aged 35, a drunkard and vagrant, was found by workmen, at six o'clock A.M., in the upper part of the lime-kiln whose structure is described in the previous case. It could not be ascertained at what hour McM. went to the premises, nor where he had been the day before.

External Appearances. — Autopsy fifty-seven hours after the finding of the body, the season being mid-winter, and the body having been kept in a cool room. The skin was of a dull-pink color, with many irregular patches of a deeper pink discoloration about the dependent parts and over the front of the neck and arms. The body, as well as the clothing, had escaped the effects of burning to which it had been exposed, except that on the outer side of the right thigh and in the right groin the skin was much reddened, and the cuticle was vesicated and partially detached. The pupils were semi-dilated. The mouth was closed.

Internal Appearances. — The muscles were of a fresh, florid color. The right cavities of the heart were distended

with blood; the left ventricle was firmly contracted, but contained a few drachms of blood. The blood was of a bright arterial color in all parts: it was a little thicker than in the preceding case, but it contained no clots. The lungs were fully engorged, — purple externally, and of a rich maroon on section. There was no œdema. There were no sub-pleural ecchymoses. The bronchial and tracheal mucous membrane was deeply reddened; that of the larynx and buccal cavity was of nearly natural paleness. The hyperæmia of the other organs was quite as marked as in the previous case. The kidneys and spleen were enlarged, the former weighing seven and seven and a half ounces, and the latter eleven ounces. The stomach was empty; its walls were fully injected. A fresh specimen of the blood, under the microscope, showed the blood-globules to be shrunken, and to have lost their characteristic contour; and a spectroscopic examination by Dr. E. S. Wood found the characteristic bands of the blood in carbonic-oxide poisoning.

X. *Asphyxia by Illuminating Gas.* — This woman, an ignorant servant-girl from Nova Scotia, took a room in a hotel in the evening of Jan. 8th, 1878, and retired early. Next day, at 1 P.M., the house-keeper noticed the odor of gas in the entry outside the lodger's room; her door was forced, and she was found in bed, unconscious and moaning; her face was livid; her hand was over her mouth. The air of the room was saturated with gas, and there was no ventilation. The stop-cock of the gas-fixture was turned on "full." Physicians were called, who used stimulants, artificial respiration, and other measures; but the patient did not regain consciousness. She died at 5 A.M., Jan. 10th. There were no convulsions. The pupils were dilated and fixed.

External Appearances. — Autopsy nine hours post mortem. Cadaveric lividity fully developed, of a dusky purple color throughout dependent parts. Slight rigor mortis. Body cooled slowly, although the temperature of the atmosphere was below the freezing-point when the body lay in the morgue. The eyes were bright, the pupils dilated. The facial expression was calm.

Internal Appearances. — The right cavities of the heart were distended with very dark fluid blood; the left ventricle was in systole, and the small amount of blood contained in it held a few imperfectly formed clots. The blood in other parts of the body was of dark color and free from clots. The lungs were engorged, being of a uniform mulberry color on section, and exuding blood freely. The bronchial mucous membrane was reddened. The kidneys were injected. Spleen normal. The intestines were pale and distended with flatus. The stomach and liver presented nothing noteworthy in their appearance. There was hyperæmia of the brain and its meninges.

XI. *Asphyxia by a foreign Body lodged in the Pharynx.* — This man (aged 35) was found in a moribund condition, lying on the ground in a vacant lot. He died while being removed to a neighboring house. Nothing could be ascertained concerning him and his previous condition, beyond the fact that his habits of life were irregular, and that he was addicted to the use of alcohol.

External Appearances. — Autopsy forty-one and a-half hours post mortem. Rigor mortis unusually developed. Cadaveric lividity of all the depending parts (those subject to pressure excepted), as well as of sides of thorax, of ears, and front of neck; the color being a dull purple. The pupils were two mm. in diameter; the corneæ were bright. There was a drop of seminal fluid at the meatus urinarius.

Internal Appearances. — Engorgement of right cavities of the heart and of the lungs. Blood very dark and fluid. If any sub-pleural ecchymoses were present they were obscured by the general adhesions of the pleural surfaces. The bronchial mucous membrane was fully injected. The peritoneum, spleen, and kidneys were engorged. The intestines were normal. The stomach contained twelve ounces of recently ingested food, consisting of imperfectly masticated potato, carrot, beet, and boiled ham. The liver did not show any increase in its blood-supply. The vessels of the scalp, meninges, and brain were fully injected. The larynx, pharynx, and trachea, with the tongue, were removed to-

gether. Crowded firmly into the upper part of the œsophagus was a mass of boiled ham, requiring some force for its removal. Its size and shape were those of a large hen's egg, its edges being ragged from partial mastication; its weight was one ounce and a quarter. It consisted of muscular tissue held together by tough fascia; it was imperfectly cooked. None of it was in the larynx, but it effectually plugged the pharynx, and produced asphyxia by pressure against the posterior wall of the larynx.

XII. *Asphyxia in a burning Building.* — Deceased (aged 32) lived with his mother in the upper part of a two-storied dwelling-house. Fire was discovered breaking out of the windows of the lower (unoccupied) part of the house at 2.30 A.M. After the fire (which destroyed all the back part of the building) was extinguished, the firemen found the bodies of the mother and son in a front chamber, the former on the floor, the latter in bed, and without any sign of disturbance before death, or of struggling or effort in the act of dying.

External Appearances. — Autopsy thirty-six hours post-mortem. Rigor mortis. Pinkish cadaveric lividity of back and sides of thorax, and along inner parts of the thighs. All exposed parts of the body thickly smutted with soot. Epidermis of legs and feet hanging in loose shreds, without redness of subjacent or surrounding parts. Tip of tongue held tightly between the teeth. Mustache singed; hair very dry, but not burned.

Internal Appearances. — Muscles bright-florid in color. Heart engorged in its right cavities, firmly contracted on the left side. Blood bright-red in color, and very fluid; a few small, ill-formed clots in right auricle. Lungs not specially expanded. No sub-pleural ecchymoses; extreme engorgement of pulmonary tissue displayed on section. Mucous membrane of larynx, trachea, and bronchi very fully injected, and of a uniform cherry-red color; mucus mixed with soot in abundance in the air-passages. Spleen and kidneys engorged. Peritoneal vessels injected. Stomach distended to its fullest extent with air; its fluid contents consisted of an ounce and

a half of thin, turbid fluid. The head was not opened, because of the dense, parchment-like condition of the scalp, which prevented its dissection from the cranium.

CASES OF FATAL POISONING.

I. *Poisonous Agent unknown; Æthusa Cynapium (Fool's Parsley) suspected.* — Deceased, a German, occupied, with his wife, a cottage in a somewhat secluded situation near a marsh; a vegetable-garden adjoined the house. Family and social relations of the deceased and of his wife were pleasant. At 8 P.M., K. visited a neighbor on a friendly errand; he seemed in his usual health and spirits; he conversed freely and took part in a game. At 8.45 he complained that his head was "full and heavy," and after bathing his face at a sink went to the cellar to the water-closet. Twenty minutes later, he was found by his friends lying on the cellar-floor, with his clothing in such condition as to suggest that he had fallen forward while in the act of defecating. He was in a condition of collapse, speechless, with tremor of the limbs, and "cramps." He could give no account of his condition. He sank rapidly, had one or two slight convulsions, and died at 10.15. No vomiting or diarrhœa.

External Appearances. — Rigor mortis was apparent two hours and three quarters after the death. The autopsy was made seventeen hours post mortem. Face and lips pale. Nostrils retracted. Cadaveric lividity of back, and of ears and neck. Nates smeared with fæces.

Internal Appearances. — Heart flaccid and empty. Blood dark and fluid. Blood-supply of lungs not appreciably increased; moderate hypostatic engorgement, probably post-mortem. Bronchial mucous membrane moderately reddened. The kidneys and liver were injected. The mucous membrane of the duodenum was reddened; the intestines otherwise were normal in appearance. The stomach contained six fluid-ounces of partially digested food, of the color and consistency of thick pea-soup; a few small fragments of what appeared like the leaves of some vegetable were floating in it. On the posterior wall of the stomach, near the cardiac orifice, was a patch of vivid redness one inch by half an inch in diameter,

and the adjacent mucous membrane was injected; elsewhere it was of natural color and appearance. The bladder was empty and firmly contracted. There was marked hyperæmia of the brain and of its meninges.

An exhaustive chemical and microscopical examination of the contents of the stomach and intestines and of the remnants of food found in K.'s house was made by Dr. Edward S. Wood, but the results were wholly negative. The presence of many poisons was excluded, but the character and kind of poison actually ingested was not determined.

II. Wife of K. (Case I.) The people at the house where K. died went half an hour after his death to his house to tell his wife. She had been seen alive at 5 P.M. in her usual robust health. At 11 P.M. her neighbors found her lying dead on her kitchen floor, her head lying in a quantity of vomited matter. The table was set with dishes that had recently been soiled with food, and the remnants of a meal still remained (soup, coffee, milk, etc.) All these portions of food, together with the cooking utensils recently in use, and the vomitus found on the floor, were secured for chemical analysis. The body when found was warm, and there was no rigidity in the limbs.

External Appearances. — Autopsy forty hours post mortem. The appearances were identical with those in the preceding case.

Internal Appearances. — The hyperæmia of the heart, lungs, kidneys, spleen, omentum, and brain was more pronounced than in the case of the husband. The stomach was normal in appearance; its contents were similar in appearance to the contents found in K.'s stomach, the dark-green vegetable fragments, resembling spinach, being present in considerable amount. The liver was hyperæmic. The intestines were nearly empty and their mucous lining was natural in appearance. The œsophagus was moderately reddened at its lower end. There was marked hyperæmia of the cerebral and spinal meninges.

The results of the chemical and microscopical examination were negative, as in the preceding case.

III. *Poisoning by Paris Green; Suicide.* — This girl (aged 22) was subject to periodical attacks of despondency, especially marked immediately after her menstruation. She left her home at 4 P.M. to do an errand for her mother; with the money given her (ten cents) she bought Paris green, the exact amount of which was undetermined. Returning home, she mixed the powder with cold water and drank the mixture. At 5.30 P.M. she began to have severe pain in her abdomen. Vomiting began at midnight, attended with great thirst and headache. Twenty-four hours after the poison was taken, no antidote having been given meanwhile, the patient was admitted to the hospital. Hydrated sesquioxide of iron was given freely and vomiting was promoted by apomorphia. Death occurred forty-eight hours after the ingestion of the arsenic. The later stages of the case were marked by profound prostration rather than by active symptoms.

Autopsy nineteen hours post mortem. The *external appearances* presented nothing noteworthy.

Internal Appearances. — The heart was normal in size and structure; its muscle was pale and friable. The abdominal cavity contained four fluid ounces of red serum. The pelvic peritoneum was injected. There was slight reddening of the lower part of the œsophagus. The mucous membrane of the stomach was not eroded nor otherwise altered; at the posterior and inferior parts were numerous punctate submucous ecchymoses. The intestines showed slight injection on their peritoneal surface, but nothing remarkable internally. The kidneys were moderately increased in size; their cortical portion was opaque, and marked with fine yellowish-white lines. The liver was pale and presented the gross appearances of fatty degeneration. The brain was not examined.

Microscopical examination (verified by Dr. E. G. Cutler) revealed well-marked fatty degeneration of the kidneys, liver, spleen, and muscular tissue of the heart. In some of the straight tubules of the kidney there was hemorrhage.

No chemical examination was made.

IV. *Opium-poisoning.* — A confirmed inebriate, aged 38. When recovering from his periodical sprees he was in the habit of taking laudanum as "a tonic." At the end of one of these debauches he was found dead in bed with a bottle, containing three fluid-drachms of tincture of opium, on the floor by his bedside. He had retired at 2.30 o'clock, was heard snoring loudly in half an hour, but nothing wrong was suspected till 7 A.M., when his dead body, still warm, was found. The exact amount taken was not determined; it was probably about five fluid-drachms.

Autopsy about twenty-nine hours post mortem, the exact time of the death being unknown. There was well-marked rigidity, and moderate lividity of the depending portions of the body. The pupils were three mm. in diameter.

Internal Appearances. — Heart engorged in its right cavities; left side empty and contracted. Blood dark in color, with a few small, imperfect clots in the right auricle, and one small, partly decolorized clot in the right ventricle. Both lungs hyperæmic in all parts; especially so in posterior and inferior portions. The pleura was injected. The peritoneum, omentum, and mesentery displayed fully injected vessels. The stomach contained half an ounce of thick reddish brown matter, without noteworthy odor; its mucous membrane was uniformly reddened; its external vessels were reddened. There was injection, both external and internal, of the intestines; their contents were chiefly gaseous. The kidneys and spleen were hyperæmic. The liver was fatty-degenerated. The meningeal vessels were engorged; but the brain itself appeared normal.

No chemical examination was made.

V. *Tartar-emetic Poisoning.* — At 2.30 P.M., Daniel M., 39 years old, took half an ounce of tartar emetic in a goblet of warm water on an empty stomach, a prescription of his own to relieve nausea after a debauch of the previous evening. In a few minutes his face grew livid, and vomiting began. Presently diarrhœa followed. Vomiting and purging continued almost without cessation, the matter ejected being thin and odorless; there was no blood. Thirst was

intense. There was severe burning pain in the abdomen. During several hours before his death M. had intervals of unconsciousness, but no recognized convulsions. There was great coldness of the extremities. Death twenty-one and a half hours after the antimony was taken. No treatment except a single dose of a mixture of laudanum, camphor, and peppermint.

Autopsy forty-seven hours post mortem. No sign of decomposition present. Rigor mortis and an unusual degree of cadaveric lividity of dependent parts. No antimonial eruption. Buccal mucous membrane very pale. Marked general engorgement of the lungs with œdema at posterior and inferior parts. Bronchial mucous membrane deeply injected. Numerous small, round, and oval ecchymoses under pericardium along posterior auriculo-ventricular groove. Fully formed dark-red clots in all the cardiac cavities. Both kidnéys and the liver were fatty-degenerated. There was no injection of the peritoneal vessels. The intestines were pale; contents chiefly gaseous, with a small quantity (about a pint in all) of thin, yellowish, viscid matter; no formed fæces. In the duodenum were numerous small, whitish particles, some floating in the contained matter, others adherent to the mucous membrane; they had the gross appearance of tartar-emetic. The œsophagus presented at its lower portion patches of a brownish-red color in the mucous membrane, without erosions. The stomach was empty and relaxed; at the upper and posterior parts were a few points of fine injection; the mucous membrane was thickened and overspread with viscid mucus; adherent to it were minute particles like those in the duodenum; in general the gastric mucous membrane was pale, and without any appearance of irritation. The brain presented nothing noteworthy in its appearance or condition.

A chemical analysis was made by Prof. E. S. Wood, and the presence of antimony was discovered by means of the usual tests.

VI. *Tartar-emetic Poisoning.* — A portion of an olive, with the stone attached, became lodged at 10 A.M., May 2, in

the throat of a perfectly healthy, though somewhat impressible, woman, 39 years old. Her efforts to eject the intruding body proving unsuccessful, the nearest doctor, an "irregular" physician, was summoned. He made an attempt to use a probang; this proving ineffectual, he said he must give an emetic. He procured from a druggist four grains of tartar-emetic; this he himself gave to the patient in a teaspoonful of cold water, the dose being taken two hours after a light meal. No drink was given then or subsequently, the reason given being that much water would by its weight have forced the olive into the woman's stomach, and thus in a direction opposite to that desired. No vomiting occurring after ten minutes' delay, the attendant gave two grains more of the tartar-emetic, although the patient said she believed the olive had passed down. The doctor irritated the pharynx with a feather, and the responsive vomiting was immediate and copious; this, with diarrhœa, continued about six hours. The olive was not found, but the patient was fully relieved of the distress caused by it, and retired at 9.30 P.M. feeling well. At 1 A.M. she was awakened by pain at the epigastrium, which persisted and increased. At 9 A.M. her usual attendant, a regular physician, saw her; she was then suffering from severe abdominal cramps, with a burning pain at the epigastrium. He gave her a quarter of a grain of sulphate of morphia subcutaneously, and repeated the injection at intervals, so that in an hour and a half she had five-sixths of a grain of the alkaloid under the skin; only slight relief followed. The patient then inhaled ether in small amount, — not to the point of insensibility. While in this act, at 12.15 P.M., her face suddenly became livid, and she fell back in a well-marked convulsion, which continued five minutes. Until 7 A.M., a period of eighteen and a half hours, she remained insensible, but without convulsions; at times her pulse and respiration failed, and she was revived by artificial respiration and stimulating enemata. The pupils were contracted. After 7 A.M. of the third day the patient so far recovered as to converse with friends and to take nourishment; but she complained still of the pain in her abdomen. At 1 P.M.,

May 4th, the condition became worse, and death occurred at 3 P.M., fifty-three hours after the tartar-emetic was taken.

Autopsy eighteen hours post mortem; the body had been in ice; there was moderate rigidity, and less than the usual amount of lividity of dependent parts.

Internal Examination. — Both lungs were engorged. The bronchial and tracheal mucous membrane was reddened throughout its extent. The heart contained dark blood, with a single ill-formed clot. The peritoneum was pale. The kidneys were moderately lessened in volume, and their color was pale. The cortex showed many pale-yellow striæ. The intestines were pale; their contents were chiefly gaseous. There was a moderate amount of semi-solid fæces in the colon and rectum; there was no sign of irritation of the intestinal mucous membrane above the sigmoid flexure; below that point there was thickening of the lining of the gut, with a brownish-red discoloration. The stomach contained fourteen fluid-ounces of yellow, rather thick fluid, with masses of milk-curd; the gastric mucous membrane was pale, except a limited patch on the posterior wall, near the fundus, of a faint brown color, without other sign of irritation. The œsophagus was of natural appearance, except at its upper part, where the mucous membrane was roughened and at a few points detached; there was no reddening. The liver weighed thirty-nine ounces; its color was pale yellow, and the other gross appearances indicated fatty degeneration, — a change which the microscopical examination fully confirmed, as well as in the case of the kidneys also. The vessels of the brain were moderately injected; otherwise the brain and its membranes were of healthy appearance.

By the usual tests Dr. W. B. Hills determined the presence of antimony in the liver.

VII. *Suicide by Hydrocyanic Acid.* — G. F. S., a drug clerk, 33 years old, subject to periodical outbreaks of inebriety which he seemed unable, though willing, to control, took from his store an ounce bottle of Squibb's dilute hydrocyanic acid, and, after careful attention to his personal appearance, went to the house of a friend, who was absent at the

time of his arrival. He was admitted by the servant, who, recognizing his intoxicated condition, conducted him to a room where he was accustomed to recover from his alcoholic excesses; here he lay down on the lounge, as was his custom. This was at 4.30 o'clock P.M.; at 10.30 P.M. he was found lying dead on the lounge, in an easy attitude, on his back. In his left hand was the bottle of prussic acid, with the cork stopper in place. It was found on measurement that a few drops less than two fluid-drachms had been taken from the bottle. When found, the body was cold, and rigor mortis was distinct.

Autopsy at 10 A.M., the second day after the death, being postponed in part to determine the length of time which a dead body may retain the characteristic odor of hydrocyanic acid.

External Examination. — Rigidity was well marked; the body had been kept at a temperature near the freezing-point since death; a faint, blue lividity of the skin of the back and of the ears, with some light-red patches about the front of the neck; eyes closed; pupils four mm. in diameter; corneæ dull. Distinct cutis anserina of thighs. No fæcal or spermatic discharge. Hands open. No odor observed.

Internal Examination. — Head opened first. Scalp quite fully injected. Vessels of meninges distended with blood, but not extremely. The lateral ventricles were dry. The puncta cruenta of the cut section were moderate in number and size. The heart was distended in its right cavities; its left ventricle was firmly contracted; its structure was normal. The blood was of a dark plum color; in the cardiac cavities were some small, soft coagula of dark color, with one partly decolorized, ribbon-like, and tolerably firm clot in the right ventricle. The lungs were fully engorged in all parts; the dark maroon color of the section being a little more pronounced in the lower lobes. The bronchial mucous membrane was injected. No sub-pleural ecchymoses. On opening the abdomen the odor of decomposition was unequivocal, although the body had been kept near the freezing-point since death. The peritoneum was pale and normal in appearance. The spleen and both kidneys were engorged.

The liver was of a pale-yellow color, weighed four pounds one ounce, and was not hyperæmic. The stomach contained two ounces of thick, brown, semi-fluid matter; its mucous membrane was of a uniform dull pink or "lake" color, except at fundus, where there were numerous fine dots of submucous ecchymoses; the muscular wall was thrown into thick rugæ. Except at the upper part of duodenum, where there was a limited patch of red discoloration of the mucous membrane, the intestines were normal. The aorta contained loose dark clots; there was general venous engorgement. There was no odor of "bitter almonds" in any part or organ, although special care was taken to detect it if present.

Analysis by Prof. E. S. Wood determined the presence of hydrocyanic acid in the body, by means of the usual tests.

VIII. *Suicide by Cyanide of Potassium.* — J. P. S., aged 52, a man of intemperate habits and without a home, supported himself by peddling a solution of cyanide of potassium as a household metal-polish for cleaning silver and other metal ware. The strength of the solution was "a lot of the cyanide, as large as a large English walnut, dissolved in a quart of water." At 12.15 P.M., while out of sight in a restaurant-stall, where he had just been served with dinner, he swallowed a three-ounce bottle full of the cyanide solution, intending suicide, as he subsequently confessed. When he was discovered, fifteen or twenty minutes later, he was very weak, being scarcely able to speak. He was made to swallow a quantity of ground mustard and water, but it produced no effect beyond a little retching. He quickly fell into a collapse, — pulseless, insensible, stertorous breathing. He died at 2 P.M., one hour and three quarters after taking the poison.

Autopsy twenty-four hours post mortem. Moderate rigor mortis. Pale-blue patches of cadaveric lividity upon dependent parts, and to a slight extent over the front of the shoulders and neck. Corneæ bright and life-like. Mucous membrane of mouth pale.

Internal Appearances. — Head opened first. Moderate

hyperæmia of meninges and of brain substance, with an excess of serum within the arachnoid. Heart engorged on right side; firmly contracted in left ventricle. Blood very dark and uniformly fluid. Lungs fully engorged. Spleen, kidneys, and liver injected to an extreme degree. Except a slight degree of reddening about the upper part of the duodenum, the intestines were normal. The stomach contained a pint of mingled fluid and solid food recently ingested. The gastric mucous membrane was in a state of intense and uniform injection, the color being a rich, dark maroon. There was no odor of "bitter almonds" in any part of the body.

No analysis was made.

DEATH BY COLD.

I. The dead body of this unknown infant was found early in the morning of Nov. 27th, lying on the frozen ground at the foot of the steps of an out-house in the premises of the Massachusetts Infant Asylum. It was thinly dressed, without covering to the head; a woollen cape was found near by, at the foot of the steps, out of reach of the child. A heavy frost had occurred the night previous. It appeared probable that the child had been left on the steps of the building (a laundry), in the hope that its cries would attract attention to it, and that it would be taken into the asylum and cared for. The attendants of the asylum heard no noise outside during the night, and the child had perished from exposure, having first rolled from the steps upon the ground, as indicated by its position when found. The footprints of a man were found in a garden adjacent, taking a course, by long strides, away from the out-house. The body when found was lying on the left side, with the cheek, side of the forehead, side of the nose and chin, encrusted with frozen soil.

External Appearances. — The autopsy was made twenty-four hours after the finding of the body. The body was that of a white male infant, measuring twenty-eight and one-half inches in length, and weighing sixteen pounds and fourteen ounces. The age was estimated at one year.

Rigor mortis was slight. There were faint, rosy or pink patches ("frost erythema") on the skin of the cheeks, chin, forearms, penis, front of left leg, and back of both legs and over both nates. The eyes were open; pupils contracted. The mouth was open; the tongue in normal position. The four upper incisors and the two central lower incisors were fully grown. The mucous membrane of the mouth was pink, rather than pale.

Internal Appearances. — Both sides of the heart were filled (not distended) with fluid blood of a redder or brighter color than normal. No clots were found in any part. The lungs were apparently natural in color, density, volume, and blood supply. The kidneys, spleen, and liver were fully and strikingly engorged. There was injection of the mesenteric and omental vessels. The stomach contained half an ounce of partially digested food, consisting of milk and fragments of starchy matter, probably potato; there was no hyperæmia of the coats of the stomach. The anterior fontanelle was of the size of a nickel five-cent piece; in other parts the cranium was firm and entire. There was moderate injection of the vessels of the pia mater, and an excess of clear serum at the base of the brain.

CASES OF FATAL WOUNDING — (*a.*) GUN–SHOT AND PISTOL–SHOT WOUNDS.

I. *Pistol-shot Wound of the Brain.* — This child, 3 years old, while playing with his sister on the stairs in the entry-way of a tenement-house where they lived, was shot in the head by a boy of 12 years, a graduate of a reformatory institution and a neighbor of his victim. It did not appear that the shooting had any other motive than mere malicious mischief; when arrested, the boy stoutly declared that he meant no harm to the child, and that the shooting was accidental. Immediately after the ball hit him, the child became unconscious; he died in an hour after receiving the injury.

Post-mortem Examination. — There was no indication of disease in any of the thoracic or abdominal organs. The pistol-shot wound presented the following appearances. The

wound of entrance through the scalp was at a point two and one-fourth inches to the right of the middle line, and one and three-fourths inches behind a line drawn from ear to ear over the vertex. The opening through the skull was one-fourth inch in diameter, with circular outline and edges bevelled at the expense of the inner table; around this opening was an ecchymosis three and one half inches in diameter. There was a penetrating wound of the brain involving the entire vertical diameter of the right middle lobe of the cerebrum; the track of the ball being marked by a straight, open canal from vertex to base, surrounded by disorganized brain substance; the point of emergence was just behind the right optic tract; here the ball ricochetted or glanced from the petrous portion of the temporal bone and reëntered the brain, being found imbedded in the inferior portion of the right temporal lobe one inch from its wound of exit. The bullet was shortened in length, so that it was globular instead of conical; its size was that of a small pea.

II. *Pistol-shot Wound of the Brain.* — E. F. M., a weak-minded hotel-employé, 29 years old, confessed to his employer that he had stolen money from the office money-drawer and had spent it in gambling; he then retired to his room and took thirty drops of laudanum, with suicidal intent; this failing to produce the desired effect in half an hour, he fired a pistol-ball into the right temporal region. When admitted to the hospital he was in a collapse; he rallied somewhat, but remained in low condition, with occasional convulsions and comatose intervals, till his death, eighty-eight hours (nearly four days) after the shooting.

Post-mortem Examination. — The wound of entrance was just within the hairy line above and in front of the right ear; the edges of the external wound were lacerated and blackened. There was an ecchymosis two inches in diameter under the scalp around the wound. There was a rounded perforation of the skull in the upper and anterior part of the squamous portion of the right temporal bone; this opening was of the size of a goose-quill and its edges were bevelled from without inward; there were no radiating fractures. The wound in

the dura mater was marked by a thin layer of blood, where the dura was detached from the inner table of the skull. The vessels of the pia mater were fully injected, and there was a thin effusion of blood overlying the right hemisphere; over the left hemisphere there was a moderate degree of purulent meningitis. The track of the ball was transversely through both frontal lobes, just in front of the fissure of Sylvius, and above the level of the great commissure; it was marked by a pulpified mass of brain substance of a pinkish-gray color, with numerous points of hemorrhage at the periphery of the wound. The bullet, after passing through the brain, impinged upon, without penetrating, the dura on the left side, rebounded from the squamous portion of the left temporal bone, and was found in the left middle lobe, just behind and below its point of emergence; it was of the size of a small pea.

III. *Pistol-shot Wound of the Brain.* — R. M., a keeper of a boarding-house, was shot in the face by one of his lodgers, who had a grudge against him. He at once fell and became unconscious. He was admitted to the hospital within an hour after the shooting. He did not recover consciousness. He died twenty-eight hours after the shooting. The distance of the assailant from his victim at the time of the shooting was not determined accurately.

Post-mortem Examination. — The wound of entrance was in the left side of the nose, one inch and a half below the inner canthus of the left eye, and in the midst of an abundant collection of powder-grains imbedded in the skin. The bullet-wound was covered with a crust, which, being raised, showed an opening with inverted edges and of the size of a goose-quill. A probe, entered here, and allowed to take a course by its own weight, passed into the left nostril through the septum, into the right nostril, and backward and upward in a direct line under the orbit, to emerge within the cranial cavity in the middle fossa, just to the right of the sphenoidal fissure. The dura mater at this latter point showed a perforating wound, with irregularly rounded outline and ragged edges, and a moderate extravasation shading the periphery of the wound to the depth of two or three lines. The vessels of the

pia mater were injected. A clot of dark color and soft consistence, and measuring two fluid-ounces, overspread the right hemisphere. The inferior part of the middle cerebral lobe was lacerated and disorganized to the extent of a large English walnut, being pulpified and shreddy, with many hemorrhagic points at the outer portion. In this region the bullet was found, scarcely altered from its regular conical shape.

IV. *Gun-shot Wound of the Thorax.*—A. S., a draughtsman, 50 years old, was sitting at his desk twenty feet from the window of the room (in the fourth story of a furniture manufactory), when a rifle bullet, passing through the lower sash of the window, entered his body just below the angle of the left scapula. That the rifle was fired from a distance was shown by the wound of the man's back, which was three feet below the perforation through the glass of the window, twenty feet away. S. entered the hospital July 10th, at 6.30 P.M., immediately after the wounding. He was in all respects comfortable after the primary shock had passed, and during the three following days showed no symptoms worth noting. July 14 he had pain referred to the left side, low down. Next day the pain was severe enough to require morphia; the temperature rose to 104°; the pulse was 140. Death occurred at 4.30 in the afternoon of the fifth day.

Autopsy six hours post mortem. The wound of entrance was five and a half inches to the left of the spine, and one and three-quarters inches below the angle of the left scapula; it admitted the little finger; its edges were ulcerated and in process of healing. A probe, entered at the wound, passed downward and to the right. The subcutaneous tissues were extensively ecchymosed. Thin pus exuded from the wound. The pleura was perforated at the lower margin of the tenth rib (left), the rib itself having been broken by the missile, leaving a jagged semicircular notch at its angle, and about two inches below the external wound of entrance. The left pleural cavity contained thirty fluid-ounces of thin, red, serous fluid, with a few flakes of lymph. The left lung was adherent inferiorly and posteriorly. The vessels of the left

pleura were fully injected. The lung tissue was dense and carnified; its volume was reduced two-thirds. Lying behind the pericardium, between the lung and the spine, was a rifle-ball weighing three-fourths of an ounce; around its conical points were fragments of cotton and woollen shirting, like that worn by the patient at the time of the injury. Search was made for any wound of the lung, but no trace of injury was found.

(*b.*) PENETRATING KNIFE–WOUNDS OF THE ABDOMEN.

I. Early in the morning (before twilight) of July 4, 1878, the deceased (aged 18) was assaulted and stabbed by an unknown assailant. He walked nearly half a mile, to a police-station, to report the assault, and was then taken in a carriage to the hospital, a mile distant. On entrance to the hospital it was found that there was a punctured wound of the abdomen, just to the left of the epigastrium, with an omental hernia protruding from the wound.

Post-mortem Examination. — Externally the wound presented the following appearances: it was situated between the ensiform cartilage and the cartilage of the tenth (left) rib, and its long diameter was parallel with the costal cartilage. Its edges were dry. Its shape was an elongated oval, the diameters being one inch by three-eighths of an inch. The wound took a direction downward and inward, through the abdominal wall; the cut in the peritoneum being one inch below the external wound, and measuring twelve-sixteenths of an inch in length; its sides were apposed. Immediately within this wound were the stomach and the left border of the liver, neither of which organs was injured. The peritoneum was injected to a marked degree in all parts. Over the upper and anterior part of the liver was a thin layer of lymph, but the intestinal folds were free from adhesions. In the abdominal cavity were twenty-four fluid-ounces of thick sero-pus, of a dirty port-wine color.

II. In the course of an angry altercation about family matters, J. H. F. (aged 24) was stabbed by his brother-in-law, at 6 P. M., the weapon used being a knife made by the

assailant, and measuring ten inches in length, with a blade six inches long and one inch and a half wide, sharpened on one edge and tapering to a point. Hemorrhage from the wound was quite free. There was a hernia of the tranverse colon covered with omentum, the hernial protrusion being of the size of a large lemon. The wounded man sank steadily, and died at 10 P. M., four hours after receiving the stab.

Post-mortem Examination. — The external characters of the wound, after the hernia was reduced, were as follows: it was situated one inch and three-eighths to the right of the middle line, and its long diameter was parallel with that line; its upper extremity was just under the border of the ribs, in the right hypochondrium. Its length was two and eleven-sixteenths inches. Two inches from the upper end of the main incision there was a notch or secondary cut, five-sixteenths of an inch long, and in direction at right angles to the other. The edges of the wounds were symmetrical, regular, and clean-cut. The upper end was a sharp taper; the lower end was rounded.

The abdominal cavity contained twenty-seven fluid-ounces of mingled fluid and clotted blood, of dark color and offensive odor. The heart and lungs were anæmic. The liver presented a cruciform cut on its upper surface, one inch to the right of the broad ligament, and two inches behind the anterior border; the longer cut was two and seven-eighths inches long, the cross-cut was one and one-half inches long. On the inferior surface of the liver, close to the left border of the gall-bladder, was another cruciform cut, the wound of exit, its measurements being one and thirteen-sixteenths by one and one-quarter inches. Exposure of this wound through the substance of the liver showed it to be clean, smooth, and thinly smeared with effused blood. The right kidney lay in a mass of fat, infiltrated with blood. The intestines were wounded at three points: immediately below the pylorus the duodenum had a perforating cut from the front backward, both walls being penetrated; in the transverse portion of the duodenum was another pair of cuts; four feet below the beginning of the jejunum there was a single slit in the intestinal wall, as if the knife had glanced upon a fold

of the intestine without fairly dividing it. The intestines were distended with blood as far as the ileo-cæcal valve. At the anterior border of the right psoas muscle, opposite the body of the fifth lumbar vertebra, was a cut in the muscle three-fourths of an inch long and one-half an inch deep. The brain was pale, but healthy.

RUPTURE OF VISCERA BY EXTERNAL VIOLENCE.

I. *Rupture of the Liver.* — Dennis O'B., aged 60, drunk and quarrelsome, met an acquaintance, H., who urged him to go home. O'B. refused and resisted. H. became angry, threw O'B. to the ground upon his back, and, while holding him in that position, knelt upon him, driving the knees with force several times against O'B.'s body. The latter immediately became helpless, and fell into a condition of collapse. He was admitted to the hospital, where he died thirty-three hours after receiving his injuries, and without reaction from the shock produced by them. There was much pain in the abdomen, and persistent vomiting of mucus.

Post-mortem Appearances. — Externally the body was wholly free from the signs of violence. In the peritoneal cavity were three pints of thin, port-wine-colored fluid. The space between the stomach and the inferior surface of the liver contained a clot of the thickness and breadth of a hand. The liver was lacerated superficially at several points upon its inferior surface; in the interior of the larger lobe were two firm clots, each of the size of a small lemon; one of these excavations communicated with the peritoneal cavity through an opening at the left border of the gall-bladder; the tissue surrounding these clots was soft, injected, and partially disorganized to a considerable depth. The general color of the liver was pale; its vessels were distended with blood. The fifth rib on the right and the sixth rib on the left were fractured transversely, at about their middle point; the sixth and seventh ribs on the right, and the seventh, eighth, ninth, and tenth ribs on the left were loosened and partially dislocated at their spinal articulation.

II. *Rupture of the Bladder.* — It appeared in evidence at the inquest upon this case, that the deceased, C. F., aged 22, was in his usual health, when, on the evening of July 6th, in the course of a quarrel, he was thrown down, his assailant falling upon him and coming down with great force upon his abdomen. Both men were drunk, and the bladder of F. was full of urine. F. immediately became helpless, and complained of great pain above the pubes; he desired to urinate, but was unable. He passed the night in a police-station, and next day was admitted to the hospital in a partially unconscious condition. There were bruises about the head, but none on the abdomen. He still complained of pain in the region of the bladder. A catheter was passed, and a little turbid urine was withdrawn; morphia was given as occasion demanded. July 8th, sixty ounces of urine, containing pus and blood, were withdrawn at one time. On this day the pain in the pelvis increased, with tenderness, and symptoms of peritonitis were developed more fully. July 9th, the ordinary amount of urine (still containing pus and blood) was drawn. July 10th, the patient passed a little urine, but his efforts had to be supplemented with the catheter. He grew steadily worse in the manifestation of general peritoneal inflammation, and died at 1 A.M., July 11, a little more than five days after the injury.

Autopsy fourteen hours post mortem. Cadaveric rigidity and lividity fully developed. There were bruises of the lids of the right eye, and in the right temporal region, under the tip of the chin and across the bridge of the nose. No marks of violence about the abdomen. The peritoneal cavity contained seven fluid-ounces of thin, sero-purulent matter, with a strongly-marked urinous odor. The intestinal folds were agglutinated. The peritoneum was injected and thickened. There was a laceration of the posterior wall of the bladder presenting the following appearances: externally, two inches below the fundus and to the left of the middle line, there was an elliptical opening three quarters of an inch in its long diameter, and involving, as seen from without, the serous and mucous coats simply, with a small aperture, three-eighths of an inch long, into the cavity of the bladder.

On the inside of the cavity there was a rent of the posterior wall, crescentic in shape, and two inches long, its edges being parted half an inch at their widest portion, where there was free communication with the peritoneal cavity through the aperture seen externally. The muscular coat exposed at either side of this aperture was covered with a firm, thin, grayish-white slough. The mucous membrane outside the limits of the laceration was of a dark-red color to the depth of two or three millimeters, and the entire lining of the bladder was fully injected, but was otherwise healthy.

III. *Rupture of the Bladder.* — Five days before her death, this woman, aged 28, a drunkard and prostitute, fell down stairs while intoxicated. Upon recovering from her debauch she complained of great pain in her abdomen and of great desire to urinate, with inability to do so. A small amount of bloody urine was withdrawn by means of a catheter. The retention, hæmaturia, and abdominal pain continued in spite of treatment, and on the fourth day the woman was admitted to the City Hospital. She vomited once only, a few hours before her death, which occurred at the end of the fifth day after the accident.

Autopsy nineteen hours post mortem. The abdomen was distended and tympanitic. The usual median section of the abdominal wall opened upon an extensive mass of slough in the hypogastric region, from which a strong urinous odor was exhaled. The pelvic organs having been removed *en masse*, there was found in the posterior wall of the bladder, well to the right of the middle line, a rupture two inches long, crescent-shaped, with symmetrical edges, and taking a direction parallel with the longitudinal muscular fibres; it involved the entire thickness of the muscular and mucous layers of the vesical wall, and its upper end was near the summit of the organ. Through this rent the urine had escaped freely, infiltrating the subperitoneal connective tissue in all directions; in front, as far forward as the umbilicus, posteriorly, as far up as the posterior segment of the diaphragm, and downwards, into the deeper parts of the pelvis; the infiltrated tissues were dark-brown in color, full

of fluid, and exhaled an offensive urinous odor. The mucous membrane of the bladder presented numerous small, slightly raised dots and patches, with a dark-red base and a slaty gray summit (diphtheritic cystitis); at the base and neck of the bladder the mucous membrane was deeply injected. There was no peritonitis.

IV. *Rupture of the Heart.* — While this man, a laborer, 38 years old, was standing upon a platform at the edge of a deep sewer excavation, a cart was backed carelessly against the platform, throwing it and its occupant into the cut, — a fall of twenty feet. In his fall the man struck on cross-timbers used to shore up the sides of the excavation. The bottom of the cut was soft mud and clay, and out of this the injured man was taken, after an unavoidable delay of ten minutes; he died in ten minutes after his rescue, twenty minutes after his fall.

Autopsy twenty hours post mortem. There were some abrasions about the face and forehead; on each side of the sternum, between the second and third costal cartilages, were slight superficial excoriations of the skin. The absence of severe bruising was noteworthy; there were no external appearances in the least suggestive of the severe internal injuries. The soft parts overlying the sternum presented slight ecchymoses under the external abrasions. The body of the sternum was fractured obliquely. The fifth and sixth ribs on the left were broken at their middle point. On incising the pericardium, bloody fluid welled up; four ounces of this having been sponged away, and the pericardium still farther exposed, the heart was found surrounded by a recent, dark-red, soft clot, entangled and held firmly by bands of old inflammatory adhesions; one of these bands had been ruptured. At the apex of the heart was a small superficial rent in the cardiac muscle; it did not penetrate into either cavity. There was a rupture of the interventricular septum, transverse in direction, and permitting free communication between the two ventricles. At the inferior part of the pericardium was a rent, crescentic in shape, extending from the apex of the heart to the right, and upward along the right border of the

heart, a distance of four inches; it involved the entire thickness of the pericardium and the upper layers of the muscular fibres of the diaphragm. The structure and appearance of the heart, in other respects than the rupture, were healthy.

V. *Rupture of the Heart.* — While driving a team, which was heavily loaded with lumber, this man (aged 30) fell from his seat on the wagon, and both wheels on one side of the wagon passed over his thorax. He lived a few minutes only, the exact time of his death being undetermined, as he died in a carriage while on his way to the hospital. The clothing over his thorax consisted of a flannel undershirt, cotton shirt, a woollen vest (buttoned), and a sack coat (open).

Autopsy twenty hours post mortem. On the front of the chest, just below the nipple line, were four small points where the skin was superficially abraded, without ecchymosis or discoloration; these were the only points about the thorax presenting the external signs of injury. The pericardium contained seven ounces of mingled fluid and clotted blood. The right auricle presented a rupture of its anterior superior wall, just in front of the venæ cavæ, and to the left of the appendix; the laceration was irregular in outline, with ragged edges, and admitted the tips of three fingers. The auricular septum had a rupture half an inch long in front of the fossa ovalis. Both ventricles were firmly contracted and empty. The edge of the left lung, adjacent to the rupture of the auricle, had a superficial laceration, one inch long, and two or three lines deep. There was no bruising of the thoracic muscles, nor were any ribs broken, by the external violence. The heart presented no abnormal appearances other than the ruptures above described.

SUDDEN DEATHS IN CONSEQUENCE OF NATURAL CAUSES.

I. *Aortic Aneurism.* — This woman (65 years old), of erratic habits, spent her days going about the city picking up what she could by begging, and passing her nights wherever she could get a lodging. During the two weeks

preceding her death she lodged in an extremely poor locality, making her bed at night on the floor of the room. On the 25th of October she was out all day, as usual, returning to her quarters in the evening in her accustomed health. She went to bed at 10 P.M. The next morning she was found dead in bed, her body still warm, and without presenting any appearances of having been disturbed. Once or twice her acquaintances during the last months of her life had heard her make some allusion to her "heart," but not in a way to attract attention; at all events, her daily avocations had not been interrupted.

Autopsy about thirty-six hours post mortem. The pericardium was distended and quite uncovered by the lungs anteriorly; it contained ten ounces of fluid and clotted blood. The heart was moderately and uniformly enlarged; its color was normal; its muscle was friable; its cavities were empty; its pulmonary valves were normal; its aortic valves were thickened at their free border, but were competent; its mitral valves were healthy. The aorta, beginning immediately above the valves, was dilated, mostly at the expense of the convex side, the enlargement involving the ascending and transverse portions of the arch; it was not sacculated, but was regularly fusiform, its calibre being that of a small lemon. The wall of the artery was thinned moderately, and its intima, not only in the dilated portion but far down in the thoracic portion, was thickened by large irregular patches of atheroma, some of which had become calcareous plates. Immediately to the right of the origin of the innominate artery, on the upper curve of the transverse portion of the arch, was a rent in the arterial coats, one inch long, involving the entire thickness of the aortic wall; the edges of the fissure were somewhat irregular, indented; but the general direction was straight and transverse. The inner rupture was wholly beyond the line of pericardial union to the external coat; while the external rent (into the pericardium) was well below that line, and appeared as a longitudinal slit, one inch and a half long, with symmetrical edges, its situation being on the convex border of the ascending portion of the arch; so that it appears that the blood, escaping through the rent

in the inner and middle coats of the aorta near the innominata, instead of rupturing the outer coat and filling the pleural cavity, "backed up" beneath this external coat a distance of two inches and distended the pericardium, the intervening space showing a distinct discoloration marking the boundaries of the detached serous layer. The other organs of the body presented nothing remarkable.

II. *Aneurism of the Aorta.* — This man's death was not wholly unexpected, although it occurred at last quite suddenly. He was a tailor by occupation, and his age was 50 years; for many months he had complained of what he called "neuralgia about the heart." Active motion brought on a most distressing dyspnœa. He had consulted physicians, one of whom treated him for "liver complaint." One morning he left his home in a suburban town and came to Boston on the train, feeling as well as usual. Soon after his arrival in the city he appeared at a beer-saloon, where he was well known, and said he was very sick; he was pale, haggard, and "panting for breath." A policeman was called who took him in a carriage to the hospital; he died on the way.

Autopsy thirty hours post mortem. The left pleural cavity contained ten fluid-ounces of thin, red fluid. Both lungs were œdematous to an extreme degree. The pericardium contained five fluid-ounces of straw-colored serum. The heart was normal in size and color. The right auricle was distended with dark blood containing a few clots. Both ventricles were firmly contracted; the mitral valve was normal; the tricuspid valve admitted four fingers easily. Projecting from the anterior wall of the aorta, immediately above the aortic valves, was an aneurismal sac of the size of a small orange. Its wall was translucent at its outer portion; elsewhere it was lined by friable coagula, or masses of fibrin. The opening to this aneurism, viewed from within the aorta, was one inch above the right semi-lunar valve; it appeared as a round aperture, half an inch in diameter. The aneurism was so situated that it overlay and nearly obliterated the pulmonary artery; it rested upon the front of that vessel, pressing downward upon its semi-lunar valves,

and obviously obstructing the pulmonary circulation to a very marked degree. The calibre of the pulmonary artery was sensibly diminished. The aortic valves, immediately behind this aneurismal outgrowth, were thickened and roughened, as was also the intima of the aorta itself.

III. *Embolism of Pulmonary Artery.* — December 24th, 1879, this woman (aged 20) was delivered at or near full term, at the Boston Lying-in Hospital. Before her confinement she had convulsions, and the labor was hastened by manual interference on that account. There was slight albuminuria, which disappeared shortly after the delivery. Her convalescence was slow. At one time an attack of pneumonia threatened serious results. A little later there was a painful swelling about the left elbow, suggesting a thrombus and phlebitis. But she rallied from all these conditions, and left the hospital in the afternoon of January 28, fully convalescent, a moderate degree of weakness only remaining. She went to her home, half a mile distant, feeling comfortable and in good spirits. She passed the night quietly, and took a moderate breakfast the following morning. A friend left her, after her breakfast, about to rise from bed to dress. In nine or ten minutes the same person returned to the room to find the girl dead on her bed, where she had fallen while dressing. There was a small amount of vomited matter on her clothing.

Autopsy twenty-five hours post mortem. There were the usual signs of recent pregnancy and delivery. The heart was of normal size, rather pale in color; its right cavities were fully distended with dark, fluid blood; its left ventricle was firmly contracted, and empty; its muscular tissue and valves were healthy. The pulmonary artery was plugged by a firm clot, occupying nearly its entire canal, and protruding in a conical shape into the cavity of the right ventricle. It was continuous with the clot in the right and left divisions of the pulmonary artery, presently to be described. The lungs were of pale color throughout the upper and anterior parts; there was moderate hypostatic injection of the inferior and posterior portions. Upon the posterior aspect of the right lung was a group of punctate sub-pleural ecchymoses, covering a space

as large as the hand; and in the midst of these were three nodules of indurated tissue. The left lung showed a few subpleural ecchymoses at its posterior border. On section the lungs presented the appearances of uniform engorgement, without œdema. The nodules above mentioned presented on section a central nucleus of gray color, surrounded by a wall of reddened indurated pulmonary tissue, the whole forming a mass of the size of an English walnut, and situated superficially near the free posterior border of the lung. The right and left pulmonary arteries were plugged with a firm, somewhat laminated, brownish-red clot, presenting irregular striæ of a lighter color at its periphery. This clot was traced to the smallest subdivisions of the arteries in each lung; and in the right lung the distal portions of the clot were decolorized and very firm, in immediate relations with the nodules before described. The bronchi of the right lung contained coarse, mucous froth. In the inferior vena cava, just above the junction of the common iliac veins, there was a clot, cigar-shaped, with the pointed end upward; its size was that of the little finger. The vein itself was healthy. At the right side of the uterus, occupying the space between it and the psoas muscle, was a mass of indurated tissue, of the size of a small orange, the product of recent inflammation. The internal iliac veins, on both sides, contained coagula; the external iliac veins were free. The uterus measured internally, from os to fundus, three and a quarter inches. The os externum was widely patulous; a laceration, situated on the right side, extended obliquely forward and to the right through the cervix, its depth varying from two to five millimeters. The mucous membrane of the womb was covered with a thin, viscid, red matter. The placental site was plainly to be seen on the right side. The muscular wall measured half an inch at the fundus; it was yellowish-white in color, and quite friable. In the posterior segment of this wall was a small, funnel-shaped depression, leading to a sinuous track in the parametrium, and extending fairly out to the pelvic peritoneum, and in close relations with the induration at the right side of the uterus. Other organs and regions of the body presented nothing noteworthy.

IV. *Hemorrhage into and around the Pancreas.* — This man, 31 years old, a printer, of intemperate habits, was seized suddenly with pain which he referred to the epigastrium. Up to the time of this attack he had been in good health, except a slight cold, which had given him some inconvenience during the week previous; but had not confined him to his bed or room. At noon, on the day of his death, he ate his usual hearty dinner. The pain of the attack, which began about 6 o'clock P.M., was soon followed by nausea and an ineffectual attempt to vomit. Presently collapse supervened; the patient was scarcely able to speak; he fell from his chair to the floor; he was evidently in extreme distress. While in this condition he was seen by a physician, who prescribed a stimulant (hot brandy) which seemed to produce a momentary reaction and relief. The patient died a few minutes later, while in a carriage on his way to the hospital, less than forty-five minutes after the seizure.

Autopsy nineteen hours post mortem. The heart was moderately enlarged in volume, and the left ventricle was dilated; the muscular tissue was of good color, but was quite friable. The intima of the aorta showed the products of a former endarteritis. The blood was liquid and of dark color. Both lungs were injected, and the upper portions were moderately œdematous. The bronchial mucous membrane was thickened and injected, and was covered with a muco-purulent secretion. The kidneys and spleen were injected.

The pancreas was normal in size, shape and position. The organ itself and the retro-peritoneal connective tissue adjacent to it were infiltrated with blood; not to a degree sufficient to form anywhere a free clot, but involving nearly two-thirds of the body of the organ, and spreading above and below to the distance of about an inch. The hemorrhage was most abundant at about the centre of the pancreas; section of its substance found the interior deeply stained of a dark-red color by the blood infiltrated within the interlobular tissue.

The splenic artery was enlarged and tortuous; its intima was rough and had a velvety or finely granular appearance. The muscular tissue outside the peritoneum and connective

tissue was of healthy appearance and wholly free from blood-staining. The intestines and stomach were normal; the latter contained a quantity of half-digested food.

A microscopic examination of the pancreas, made by Dr. W. F. Whitney, found the interlobular tissue infiltrated with blood, which had permeated among the cells in many places; here the corpuscles were destroyed. The cells themselves were very granular, but osmic acid failed to show the presence of fat in them.

SURGICAL CASES.

By David W. Cheever, M.D.

I. EXCISION OF THE GOITRE.

Case I. — *Bronchocele.* — Patient a female. 36 years old. Married. Four years ago she noticed a small lump in her neck. Since then it has been gradually increasing in size. At times it has caused her great pain. Upon entrance there is a tumor, about the size of a small orange, in the anterior portion of the neck and to the right of the trachea. It is freely movable and is painful on pressure; moves with the thyroid cartilage during swallowing, and appears to be attached to it. For some six weeks the patient was treated with iodide of iron, and good diet, and rest in the country. As the tumor did not diminish, and the pain continued, an operation, to attempt its total removal, was decided on.

Operation. — The patient was etherized in a sitting posture. The head having been thrown back, and the face turned to the left, a long incision was made over the tumor parallel to the sterno-mastoid muscle. Skin, fascia, and platysma were divided in uncovering the outlines of the sterno-mastoid and omo-hyoid muscles. Next, a cross-cut was made horizontally over the centre of the tumor from over the sterno-mastoid, to and beyond the median line of the neck. The omo-hyoid muscle was cut through and turned back. Next, the sterno-hyoid and sterno-thyroid muscles were carefully cut across and reflected up and down. The inferior carotid triangle was now wholly uncovered, and the tumor rose into view. It was round, solid, and very vascular. Wherever it was accidentally pricked with the knife it spurted blood, as juice spurts from a compressed orange. With much caution it was freed and lifted up with the handle of the knife and with the

fingers. The base was then perforated with a blunt needle and double ligature, and the tumor tied off and cut away in a mass, without hemorrhage. The tumor was solid, — no cysts. The base was burned with the galvano-cautery. The wound was partially closed. She went on perfectly well.

May 7th. Wound of throat doing well.

May 14th. Closing in rapidly; patient up and about.

May 19th. Practically healed.

Discharged, relieved.

She remained well one year afterwards.

Case II. — *Bronchocele.* — The patient, a young woman 23 years old, gives this history. For nearly two years she has watched her neck grow slowly and steadily. She enters with an enlargement over the thyroid, the size of a lemon, mainly upon the right side of the median line, oblong, quite dense, and freely movable beneath the skin. It extends downward from the middle of the thyroid cartilage to within an inch of the clavicle, and laterally beneath the sterno-mastoid muscle. There is a small tumor on the left side, in nearly the same position. Both these tumors move with the larynx in deglutition. She has been treated constitutionally for some time in hopes the tumor would disappear.

December 14th. Patient etherized. An incision is made parallel to the sterno-mastoid on the right side of the neck. A second incision from just over the tumor is carried horizontally across from over the belly of the sterno-mastoid, to and beyond the median line. The sterno-mastoid is drawn outwards. A large number of small vessels are ligatured; the omo-hyoid and thyroidal group of muscles are cut through; the tumor, size of a pigeon's egg and very vascular, is finally enucleated on all sides with the handle of the scalpel. Two double silk ligatures are now passed under its base and tied, either side, tightly. Another ligature is tied tightly around it, and the mass, which is very vascular, is then cut off. The surface of the stump is cauterized with the galvano-cautery, a drainage tube is passed to the base of the wound, and the flaps drawn up and stitched together in front, the outside edge being left gaping. Recovers well from ether.

December 15th. Doing well; swallows with difficulty; wound is dressed with carbolic oil, and syringed out daily.

December 19th. Examination of lungs reveals consolidation with increased vocal resonance and respiratory murmur, and fine crackling râles over the middle lobe and right front. Has a distressing cough, some muco-purulent sputa.

℞. Morph. sulph. gr. iss.
Spts. chloroform. ʒ v.
Mucil. acac. ʒ iv.
S. ʒ i. p.r.n.
Misce.

Wound looking well.

December 22d. Slough came away, with the ligatures; tube taken out. Doing well.

January 6th. Nearly healed.

January 12th. One spot not quite well, small sinus.

℞. Myrrh wash.

January 17th. Wound nearly all healed. Discharged, relieved.

Microscopically both these tumors presented the appearance of enlarged thyroid glands.

In the second case a peculiarity was observed, which has been described in a French monograph on Bronchocele. When the tumor has attained sufficient size to engage itself under and lift the sterno-mastoid muscle in its lateral growth, the apex of the lateral lobe insinuates itself between the internal jugular vein and the carotid artery. The vein is lifted forward on the tumor, and will be found, during the operation, in contact with and just under the anterior edge of the sterno-mastoid muscle, in an unusual and unexpected place, and presenting some danger of being wounded. The carotid artery, and with and behind it the pneumo-gastric nerve, will be found entirely beneath the tumor.

In bronchoceles of moderate size, the hemorrhage from the superior and inferior thyroid arteries can be more easily avoided than that from the tumor itself, which spurts every time its capsule is pricked or torn; and this capsule is very thin and delicate. The danger of including portions of the

recurrent laryngeal nerve in the ligatures, in tying off the tumor, is also a serious one.

Two other cases of my own of removal of bronchocele, and one of treatment by setons, may well be added here to complete the series.

Case III. was a young girl, with a tumor of one lobe of the thyroid gland not larger than a very small pullet's egg. It was removed without hemorrhage. No recurrence took place.

Case IV. was also a young lady, who was very much annoyed by the appearance of an oval enlargement of one lobe of the thyroid. She desired an operation, and it was removed without trouble. She remains well.

If similar cases to these last present themselves again, I should urge the trial of at least six months' medication, with iodide of iron and iodide of potash, the latter in cumulative doses, to absorb the glandular enlargement. Experience has recently taught me that there is much to be hoped for by perseverance in this treatment.

Case V. — A large-framed strong woman, of middle age, from the British provinces, was admitted to the hospital with double bronchocele, of large size. The distress in breathing was marked. Desirous of being relieved, and unable to lie down and sleep, but otherwise well, she gladly submitted to a tentative operation. Removal by excision was out of the question. On the surface of the tumor, which was overlaid with the dilated veins of the thyroid plexus, were to be felt fluctuating sacs. The bulk of the tumor was solid. Two large double setons were passed through the cysts and through the tumor. She died of pyæmia the following week.

Cases I., II., III., and IV. originated in, or near Boston. I have at present under the iodide of iron and potash treatment two other cases of large bronchocele. The patients live and have lived in this city.

II. ANEURISM.

Case I. — *Temporal Aneurism.* — B. E. H., 36 years old, by occupation a hotel-keeper, entered the City Hospital March 21st, 1879. Patient is a large, strong, healthy man. Says that there has always been a small red spot on the scalp above the left ear. Three years ago, soon after he had exerted himself powerfully in throwing a heavy trunk on to the top of a coach, a small, soft, pulsating swelling appeared on the scalp, not far above the left ear. The tumor grew quite rapidly in size, and pulsation became very perceptible. One and a half years ago, when the swelling was about two-thirds as large as it is now, the late Prof. Crosby, of New York, tied the left temporal artery and two other arteries in that neighborhood which supplied the swelling. This operation did not fully stop pulsation in the tumor; and a week afterward four horse-hair setons were put in the skin over the centre of the tumor, and tr. catechu injected about its periphery. Pulsation still remained in the tumor, though it has never been so great as it was before Dr. Crosby operated. The tumor decreased in size considerably after operation; but about a year ago it began to grow again, and in the last two months has increased considerably in size. There is no pain or tenderness, but a feeling of pressure now and then. Hearing and sight are both good. Has often heard gurgling sounds in tumor with his left ear. General health is good.

There is now a soft, circumscribed, fluctuating, painless swelling on left side of head, filling temporal fossa, and extending a little beyond it on every side. Pulsation is distinct in centre of swelling, but cannot be felt about periphery. With a stethoscope placed over tumor a thrill can be heard, synchronous with the pulse. Numerous pulsating vessels can be felt around the margin of the tumor. On percussion, both the relative and absolute dulness over the heart appear to be no greater in area than normal. Heart sounds are normal and of ordinary intensity. Radial pulse not very strong, eighty-four in the minute. On examination with the ophthalmoscope the fundus of each eye was found to be normal, and there was no pulsation in the retinal vessels.

March 25th. *Operation.* — The patient being etherized, Dr. Cheever made an incision along the anterior border of the sterno-mastoid muscle, two and a half inches long, and with its centre opposite the hyoid bone. The tissues were very vascular, and several catgut ligatures were applied. He then dissected down to the external carotid artery and tied it with a catgut ligature opposite the hyoid bone, a large vein, the temporo-facial, which overlaid the artery, and the hypoglossal nerve being held aside by retractors. On tying the artery, pulsation in the tumor stopped. The wound was closed by carbolized silk sutures, and a Lister dressing was applied. The operation was done under carbolic spray, and the instruments, etc., were carbolized. Shortly after tying the vessel the tumor became much softer. After the operation the patient complained of some pain in top of head, and of difficulty in swallowing. Not much shock.

March 28th. The dressings were removed under carbolic spray, and the sutures taken out. No pus. Wound looking well. New dressings applied.

April 5th. Wound nearly healed, only a superficial ulcer remaining. Lister dressing removed and simple cerate applied.

April 6th. Tumor has diminished one-half in size since operation. Some pulsation.

April 7th. *Operation.* — The patient being etherized, Dr. Cheever made a vertical incision two and a half inches long into the tumor, which was very tough and fibrous. Copious hemorrhage followed, which was partially restrained by thirteen ligatures. The tumor was then strangulated by seventeen deep sutures radiating from the incision toward the periphery. The actual cautery was then applied to the wound, which was finally packed with sponges soaked in a saturated solution of ammonio-ferric alum.

April 10th. Dr. Cheever removed the dressings. There was some pulsation at the bottom of the wound. The bulk of the growth appeared to be pretty effectually strangled by the deep sutures. A compressed sponge was tightly bandaged on and then wet.

April 13th. Dressings removed. No pulsation in wound or

tumor. A black slough fills wound. Face, scalp, and eyelids much swollen. Wound dressed with soda and opium wash, and bandaged not very tightly.

April 16th. There is a soft, fluctuating tumor on scalp behind wound. Dr. Cheever made an incision about one and a quarter inches long, and let out some thin, very offensive pus. Beneath the incision the bone was found bare, the abscess being subpericranial.

April 17th. Gas and pus pressed out from incision made in scalp. Pus very offensive. Slough is separating about edges. Granulations bleed on the slightest touch. Wound dressed daily with soda and opium wash.

April 21st. Soda and opium wash omitted and wound dressed with a charcoal poultice. Slough has separated, and all the ligatures have come away.

April 25th. ℞. Acidi Sulphurici Aromatici, gtt. xxx. *bis in die*, as patient complains of night-sweats.

May 3d. Granulations are luxuriant; they can be diminished in size considerably by pressure, but return to their original size when pressure is removed. No pulsation. Has had for some time pain along sciatic nerve.

May 8th. Poultice omitted and wound dressed with soda and opium wash. Bone at bottom of abscess is covered. Abscess discharges only a drop or two of bloody serum.

May 22d. Ulcer has diminished to a third of its former size. Much less swelling. Healing going on rapidly. No pulsation.

May 31st. Patient has been up and about ward for several days.

June 2d. Has had for a day or two pain in left side of chest. Physical examination negative. Ulcer on head nearly healed. No pulsation in tumor.

June 5th. Discharged, nearly well.[1]

Remarks. — It seemed probable, on examination, that this aneurism was of the variety called cirsoid. Although it had a fine aneurismal *bruit*, like a single sac, yet the margin of it was encircled by numerous distinct, but enlarged and forcible, arteries.

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[1] See Surgical Records, Boston City Hospital, Vol. 81, p. 145.

Its size, vascularity, and history decided me not to attempt its cure by primary ligature, which was unlikely to succeed; or by injection or galvanism, which were fraught with the dangers of embolism.

It remained then to reduce or obstruct its circulation by tying the main vessel which fed it.

The choice lay between the internal or external carotid. The fact that there was no pulsation of abnormal degree in the retina led me to believe that the aneurism was limited to the branches of the external carotid. It certainly seemed more rational to tie the latter, as any risk of cerebral trouble was thereby done away with.

On the other hand, it is sufficiently proved that the external is a more difficult operation, and also more dangerous *per se*, from the numerous branches which prevent the formation of a good clot; secondary hemorrhage frequently following the separation of the ligature from the external carotid. This risk I hoped to avoid by using carbolized catgut, under the Lister method. If pus did not form we should have no ulceration of the ligature through the vessel, and no risk of hemorrhage; while the worst that could happen would be a premature absorption of the catgut, and a restoration of the current through the carotid.

The event justified this opinion. The wound closed by first intention; the catgut remained in; and the carotid current was permanently occluded.

Immediately on tying the external carotid the pulsation in the tumor ceased, it paled, and in twelve hours was one-half reduced in size. It slowly refilled to a degree, and in less than two weeks pulsated a little again.

The next step discussed in my mind was about tying the external carotid of the opposite side. This, however, would not control the branches perforating the orbit through the internal carotid, nor the anastomoses on the back of the neck with terminal branches of the subclavian.

I thought the tumor was so far reduced that it could be safely attacked by the ligature. On cutting into it, it bled profusely from numerous arterial points, and demonstrated its cirsoid nature.

The subsequent sloughing and suppuration were very severe; but the patient escaped necrosis, erysipelas, or meningitis, and the contraction of the cicatrix and shrinking of the granulations promised a permanent cure before he left the hospital. A year later, he remained well.

Case II. — *Traumatic Aneurism.* — The patient, a girl aged 12 years, was brought to the hospital on the 27th of October. Five weeks previous to her entrance she accidentally drove a pickle-knife into her thigh at its middle third. At the time of the accident a physician was called, who checked the bleeding by drawing the lips of the wound together by means of plaster. In a few days the thigh began to swell, and pain increased. This condition of things still existed when she entered the hospital. The thigh was very painful, and there was a large, hard swelling which extended from a point two and one-half inches below Poupart's ligament to the condyles of the femur. The tumor was firm, reddened in spots, tender, and slightly fluctuating. The signs made us suspect that it was a diffused suppuration under the fascia lata. I made an exploratory incision, about an inch long, and introduced a grooved director; but no pus followed. I then passed my finger into the wound, and it entered a large cavity filled with soft, spongy masses; on withdrawing the finger there issued numerous soft, black clots, and a pale, pinkish fluid, which looked neither like blood nor pus. We soon saw, however, that it coagulated in the basin, showing that it was blood, and consequently that a hemorrhage was going on. A further proof was that upon compressing the femoral at the margin of the pubes the flow ceased; on relaxing the pressure it recommenced.

This revealed the true nature of the swelling. It was a traumatic aneurism connected either with the femoral or one of its large branches. It was evident that during the five weeks following the accident an enormous amount of blood had been gradually effused into the cavity, by repeated leakings. The child, previously anæmic, while under ether, grew very feeble, and was supported by enemata of brandy and water. Meanwhile a twist of rubber tubing was put around

the top of the thigh, over a roller which covered the femoral artery just at its emergence from beneath Poupart's ligament. I at once cut freely into the swelling, making an incision five inches long. A small amount of bloody fluid escaped. Just below the fascia lata was found an immense organized clot, which looked like a heart; also many smaller clots in various stages from fresh to organized. The whole mass of coagula weighed one and one-half pounds. Having carefully removed these clots I reached the femoral artery, and found that it had an oval opening, rounded by effused fibrin, and just opposite the site of the original puncture made by the pickle-knife five weeks before. With ligatures I secured the femoral above and below the opening, and washed out the cavity. During the previous weeks collateral circulation had been pretty well restored in the foot.

The femur was found to be denuded of the tissues which ordinarily surround it, though the periosteum, except at one spot, was intact. The patient was put upon stimulants, milk, strong beef-tea, and iron.

On November 3d a small slough was found on the little toe of the affected limb. Suppuration from the wound was considerable.

On the 5th of November the ligatures began to come away.

With the exception of one small point the wound is now healed (December 16th). It is kept open at this spot by the condition of the bone, which at one point is rough and denuded of periosteum. The little toe is partially sloughing, and is quite black on its plantar surface. The sloughing process has chosen this toe, probably because from the beginning the position of the leg has been such that the foot has rested almost entirely upon its outer side.

The girl looks brighter; her color is comparatively good; her gums begin to show the beneficial effect of the iron, and her appetite is increasing. She has good motion in the wounded leg. A perfect recovery ensued.

III. CANCER OF THE TONSIL: REMOVAL OF THE TUMOR BY EXTERNAL EXCISION. (A SECOND CASE.)

In 1869, the writer removed a malignant tumor of the tonsil by cutting down on it from outside the neck and opening the pharynx. So far as he could then learn, the operation was original. Subsequently, several treatises on surgery, as Bryant's, Gross's, etc., sustained his belief that the operation had not been performed before. He now finds in the *Jahresbericht der gesammten Medicin* for 1869, that Dr. Hueter says he saw Von Langenbeck operate externally, and by sawing the jaw, in 1865; and that he himself performed a similar operation the same year. Both were cases of sarcoma; Langenbeck's recovered; Hueter's died. Neither of the cases had been published; so that, having never heard of the operation, the writer supposed himself the first to do it.

After an interval of nine years, a second case has presented itself, of apparently identical nature, and has been operated on by him in a similar manner. Novelty in the operation, together with the rarity of the disease, would seem to merit publication.

Primary cancer of the tonsil is so rare that Lebert, out of nine thousand one hundred and eighteen cases of cancer, gives only three of the tonsils; Sibley, out of five hundred and twenty cases of cancer, only six; Baker, out of five hundred cases of cancer, only two.

Baker states the average duration of life, when the disease is not operated on, as being twelve and a half months.

The modes of operating previously employed had been by burning inside the mouth; by the wire écraseur inside (Bryant); by cutting and the cautery inside (J. C. Warren); by cutting for the large vessels outside, and holding them back with a retractor, and then using the écraseur inside (Demarquay); by passing a controlling ligature around the carotid, and then using a wire loop inside (Velpeau); by strangling by slow tension with a wire inside (Warren). For a complete and exhaustive account of the disease and the operations, consult Mr. Alfred Poland's article in the *British and Foreign Medico-Chirurgical Review*, April, 1872. We now pass to our case.

CASE II. — The patient was a strong farmer, over six feet tall, and 37 years of age. Four months ago, for the first time, he began to be troubled with his throat on the right side, finding an obstruction there, which slowly increased. Within the last six weeks, however, he thinks the growth has been more rapid, and has caused him to talk thickly. Now, December 20th, 1877, on the inside of the mouth the right tonsil seems to be much enlarged, bulging into the fauces; and on the outside, at the angle of the jaw, is a movable little body, not deep, and about the size of a large button.

Although it was probable that the enlargement of the tonsil was organic and malignant, and although there was neither the history nor any appearance of syphilis or scrofula, yet it was deemed best to treat the patient with specific remedies for ten days or a fortnight, and see if the tonsil diminished. He was ordered five grains of iodide of potassium, four times a day.

December 29th. As the enlargement of the tonsil was increasing fast, it was decided to operate. Omit former prescription. To have citrate of iron and quinine, six grains, four times daily.

January 4th, 1878. At this date, fifteen days after entering the hospital, the bubo, or lymphatic gland below the angle of the jaw, had tripled in size and had lost its mobility. In the fauces the diseased tonsil passed beyond the vertical line of the uvula toward the left side of the throat, leaving a narrow fissure through which the patient swallowed and breathed. It had not infiltrated the palatine pillars. It was seamed with a hard ridge at the posterior border, but was not ulcerated.

Operation. — The patient having been etherized, an incision was first made on the right side of the neck, beginning about two inches below the angle of the jaw, and extending up to the lower border of the same. A diseased gland was taken out, about one and a half inches in the long diameter, by one inch in the short. Hemorrhage was checked by ice and ligatures.

The incision was then continued at an obtuse angle forward over the lower jaw, and some two inches on to the cheek be-

yond. The opening was enlarged by a cross-cut, two inches long, directly over the lower jaw, and at about right angles to the primary incision. The digastric triangle was now uncovered by dissection, and the styloid group of muscles drawn down by a retractor. The tissues over the jaw were scraped away down to the bone, which was then partially divided with a saw, just in front of the masseter muscle, the division being completed with the bone forceps. Tracheotomy was next performed; and the pharynx separated from the trachea by a sponge over the glottis. The two pieces of the lower jaw were now everted, and held, the one upwards and inwards, the other upwards and outwards.

Next, the mylo-hyoid muscle was cut away, and, the finger being passed into the throat, the tumor of the tonsil was pushed out towards the external wound, so that it was seen bulging and covered by the superior constrictor muscle of the pharynx only. A crucial incision, about one inch long each way, was made through the superior constrictor. The tumor now came in sight plainly. With the director, and with one finger outside and one inside the throat, the diseased mass was separated and removed without serious hemorrhage. The palato-glossus muscle was divided where it adhered to the front of the growth. The palato-pharyngeus was untouched. No artery larger than the facial was divided. The subsequent perfect use of the parts proved that the hypo-glossal, gustatory, and glosso-pharyngeal nerves were intact.

After removing the tonsil a large hole opened directly into the throat, beneath and below the jaw, and between the pillars of the fauces.

The sawn edges of the jaw were drilled and brought together with one wire, and silk sutures were taken in the upper part of the vertical cut of the skin, and in the cross-cut, the original incision being left open. A wet compress and bandage were applied. At no time was hemorrhage excessive. Fourteen ligatures were used. The ends of these, with the ends of the wire, were left protruding through the wound.

Brandy one ounce, and beef essence four ounces, by the

rectum, were ordered every four hours during the night; forty minims of liq. opii comp. being added at 7.30 P.M.

January 5th. Twenty-four hours after the operation the trachea tube was removed. Patient doing remarkably well. Has retained all injections but the first. No shock. Pulse good. Some slight oozing from the external wound. Patient drinks milk by single swallows, none of it passing through the wound, though the edges are separated by the passage of air. Injections to be omitted, and milk, beef-tea, etc., to be given *ad libitum*.

January 6th. To have six ounces of sherry. Doing as well as possible. Pulse one hundred; temperature one hundred and one and three-tenths degrees F.

January 7th. Sutures removed this morning. Very little air passes through the wound below the jaw when the patient swallows. A.M., pulse eighty; temperature ninety-eight and six-tenths degrees. P.M., pulse one hundred and twenty; temperature ninety-nine and eight-tenths degrees.

January 10th. Patient up and dressed to-day, it being six days since the operation. Steady convalescence. Voice nearly as good as before the operation.

January 12th. Six ligatures came away this morning. Patient eating mush and milk in the ward dining-room.

January 14th. No pulmonary complication has followed removal of the tube. Tracheal incision entirely healed.

January 17th. No change except rapid improvement. All but three of the ligatures have now come away. Patient can open the mouth much more than he could a week ago.

January 22d. But one ligature now remains.

January 26th. The last ligature came away to-day. Patient says that for the last four days he has felt the lower jaw firmer.

January 27th. Three weeks and two days since operation. Ether being given, a crucial incision one and a half inches long in each direction was made over the jaw in the line of the original separation of the fragments. The jaw was found to be united by firm, vascular tissue. The wire was cut in two places, and withdrawn without difficulty. The wound was closed by sutures.

January 30th. Some redness and puffiness about the wound. Sutures removed. Poultice applied to side of face.

February 1st. Inflammation disappearing under poultice.

February 3d. Some little discharge from wound, which is granulating up. Examination of throat shows complete healing, as far as can be seen.

February 4th. Now one month since operation. Complains of swelling and stiffness under jaw. On examination, a small, hard, localized swelling is detected.

February 5th. The swelling noticed yesterday is found to be freely movable, and apparently situated just under the anterior margin of the sterno-cleido-mastoid muscle, close to the end of the incision made at the first operation. It being considered a lymphatic gland, probably infiltrated with disease, its removal was advised.

February 6th. The patient desiring immediate operation, Dr. Cheever came in the afternoon to perform it.

With the patient in the horizontal position, an incision two inches long was made close to and parallel with the anterior margin of the sterno-cleido-mastoid muscle. This opening was enlarged by a slight cut midway in the primary incision, at right angles to it, and toward the median line of the neck. The sterno-mastoid being held out of the way by a retractor, the gland was reached by careful dissection. It was dissected out by cautious cutting with the scalpel, hemorrhage from the first being very free.

The tumor was adherent to the surrounding parts, and lying on the carotid sheath. Numerous vessels were cut short near their origin from the carotid. Six ligatures were applied, and six sutures used to bring together the edges of the wound, an opening being left below for the passage of the knot of ligatures. Cold-water compress and bandage.

On section, the gross appearance of the gland was that of a ring of malignant disease surrounding a mass of cheesy degeneration.

February 7th. Patient suffered much from his ether, being depressed and uneasy. Hypodermic injection of one-sixth of a grain of sulphate of morphia without much effect. Pain in neck not excessive.

February 8th. Sitting up. Some redness and soreness about wound. Poultice.

February 9th. Less angry appearance about wound. Patient more comfortable. All sutures removed. Union by first intention, except around ligatures.

February 12th. Five ligatures removed. Patient up and walking about, feeling quite well.

February 17th. Jaw matches well, with no sign of division. Throat entirely healed. Slight granulating surface of second operation (for removal of wire) touched with caustic. Last ligature brought away. Omit poultice, and dress with simple cerate on sheet lint.

February 20th. Now two months since the first operation. Patient has continued to improve. Slight exuberance of granulations where the last ligature came away, touched with caustic. External orifice of mouth somewhat awry. Slight numbness over right side of chin still remains. In the site of the removed tonsil is a hard mass, the size of a bean, possibly cicatricial only, but enough to arouse suspicion. To take iodide of potassium, five grains three times a day for a month, and to be discharged.

After three weeks' absence the patient returned. The suspicious hard scar in fauces had grown into a lump as large as a small hickory nut. The outer surface of the neck was well.

Without ether the throat was deeply and repeatedly cauterized with the galvano-cautery and platinum wire. A loop was put around the growth, and it was cut off. Its base was deeply burned and shrivelled up with the white-hot platinum point. The patient convalesced readily. Two weeks later the growth had begun to start again. The patient was seated beside the kitchen range, and six irons were heated in the coals. Eighteen applications were made to the region of the tonsil and soft palate with white-hot irons. No ether was given. The patient bore the treatment with great firmness. The whole region was deeply burned, shrunken, and charred. In one week's time he recovered, swallowed well, and was again discharged April 1st.

The last week in May, less than two months after the last

cauterization, the patient again returned. The right half of the throat was occupied by a hard, lobulated tumor, which grew from between the soft palate and pharynx, and two-thirds occluded the pharynx. It was much larger than before the first operation of January 4th, five months previous. Outside, the neck was occupied by a tumor as large as a cocoa-nut, filling the neck from the jaw nearly to the collar-bone, and pushing over the larynx an inch beyond the median line. This swelling was red, angry, and œdematous, but not fluctuating. The patient could still swallow and breathe without difficulty, and had but little pain. His general health was vigorous. He was advised to forego any farther operative measures, and to try to keep himself comfortable as long as he could live; if dyspnœa supervened, to have a tube put in the trachea, and if dysphagia came on, to have the external mass incised to relieve pressure.

To recapitulate: it will thus be seen that the primary growth began in the tonsil in August. Lymphatic poisoning and a bubo formed in November. The tumor and the bubo were removed by the knife early in January. Early in February a second bubo had formed, and was removed. In March the original growth was sprouting again, and was twice burned away, the bubo not recurring. In May the pharyngeal tumor was larger than ever, and the bubo was recurrent in an enormous growth.

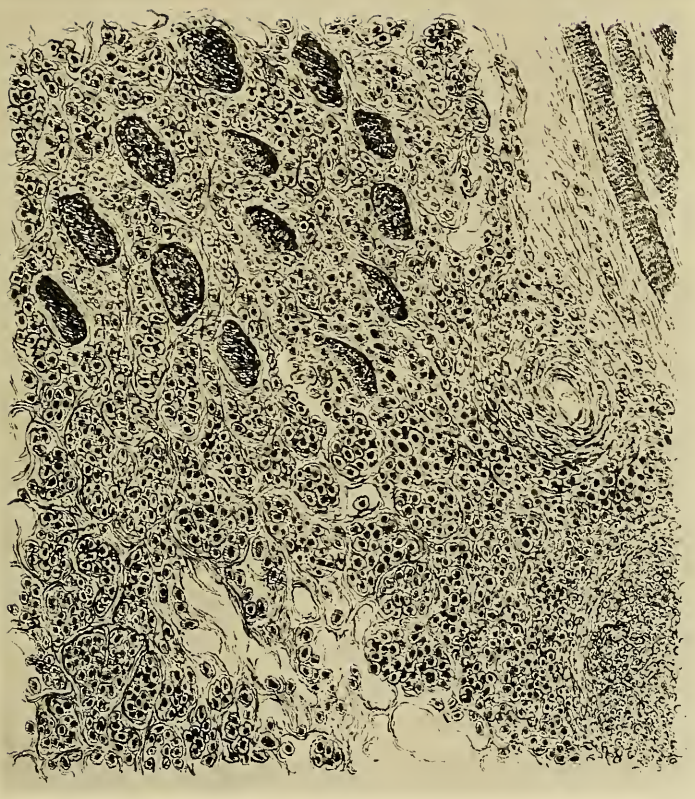
The very malignant history of this case, and the rarity of cancer of the tonsil, render the microscopic examination of the primary growth of much interest.

Numerous hardened sections were made, and compared with others from normal tonsils. Accurate drawings with the camera lucida of both are annexed. To describe with fidelity the various appearances is difficult, but we will endeavor to do so.

The cells of normal tonsil are packed in irregular lobules, but are of uniform size and rounded form. The cells of the tumor are also packed in capsules of connective tissue, but they are not of uniform size, and they are epithelioid in form. They also show some tendency to be arranged in nests. Normal tonsil has trabeculæ of fibrous and connect-

NORMAL TONSIL.

J. L. UNDERWOOD. Camera Lucida Delineavit.



CANCER OF TONSIL.

ive tissue intersecting it. In the tumor these are all displaced and obliterated by epithelioid cells. Normal tonsil is largely permeated by striped muscular tissue, in groups of bundles, and aggregated together. The tumor shows the same striated fibrillæ everywhere pushed apart by rapid and dense cell-growth. In normal tonsil it is possible to make out the lobules and follicles of the gland. In the tumor it is not. In short, in the new growth the elements of the true tonsil have been separated, obscured, and overlaid, so to speak, by a dense and enormous reproduction of cells resembling epithelial cells, with but little connective tissue.

In the tumor of the tonsil removed and described by me in 1869, the growth was largely cellular, and with but little connective tissue. The cells were uniform and ovoid. But they contained two, three, and even four nucleoli. In that case there was a subsequent infiltration of the soft palate. The patient was lost sight of, but the tumor was malignant and recurrent in all probability. It also had poisoned the lymphatics, and bubo was present in the neck. It is recorded that this lymphatic gland, thus secondarily affected, had the same cell elements and arrangement as the tumor of the tonsil.

The operation in 1869 differed in some details from the one described above, and a brief abstract of it may be permitted.[1]

In the first case, the digastric, stylo-hyoid, and stylo-glossus muscles were divided to get room. In the second case, this was gained by sawing the lower jaw and turning it up, and thus none of these muscles were cut, but they were all drawn downwards. The second manœuvre we think the best. In the first case, both pillars of the soft palate were left intact; in the second, the anterior pillar (palato-glossus) was adherent to the growth, and was divided. The largest vessel cut in each case was the facial artery. Twelve ligatures were required in the first case; fourteen in the second. In each case, paralysis of the lower lip ensued, due to the division of filaments of the facial nerve. In the first case,

[1] Vide Medical and Surgical Reports of the Boston City Hospital, First Series, 1870, page 390 *et seq.*

the tumor was smaller, the opening into the pharynx was smaller, and no fluid escaped from the wound, in swallowing liquids, after eight days. In the second case, *no fluid* escaped from the wound at all in *deglutition*, but only air was churned out. The first case was fed with a stomach tube. The second swallowed voluntarily and easily.

The fear of a permanent fistula is proved to be fallacious by the results in œsophagotomy, and it is even less likely to follow pharyngotomy.

Removal of tumors of the tonsil by *external* incision is not free from danger from the depth of the wound, the proximity of the internal carotid, and the crossing through the wound of the hypoglossal, gustatory, and glosso-pharyngeal nerves.

Says Mr. Bryant: "The removal of these tumors from *within* seems almost out of all question, whether by caustics, the écraseur, or enucleation. I attempted the latter plan in one case, with only partial success."

The question remains, whether, in view of such rapid and persistent recurrence as in the second case, it is worth while to interfere with cancer of the tonsil at all, by operation. The same doubt might apply to other cancers, especially those growing in warm and moist situations, which increase faster and are more speedily fatal than those on the cutaneous surface. Cancer in the sphenoid cells and the antrum is an example.

IV. NEUROMA IN THE FORMATIVE TRUNKS OF THE BRACHIAL PLEXUS.

Case I. — The patient, a native of Massachusetts, 46 years old, enters the hospital for relief of a neuralgia of the left arm. There is a tumor in the left subclavian triangle of the neck. This is tender on pressure, and is considered the cause of the neuralgia, which is mainly in the ulnar nerve. Patient has had a similar growth removed from the tibial nerve. (Philadelphia Med. Times, Vol. 11, No. 341, p. 181.) This was supposed to be made up of "embryonal fibrous tissue."

The tumor in the neck has been growing about four years.

Operation. — The patient was etherized in a recumbent position. His face was turned sharply to the right side. The left shoulder was depressed by an assistant grasping the fore-arm. The outline of the left subclavian region being thus defined, the tumor appeared in relief, moderately prominent, and near the posterior edge of the sterno-mastoid muscle.

A long incision was made, just above and parallel to the clavicle, extending beyond the middle of the insertion of the sterno-mastoid muscle. It was about three inches in length. The skin and superficial fascia being divided, the posterior belly of the omo-hyoid now appeared, overlaying the tumor. This muscle was divided transversely, and the ends dissected back. Especial care was now necessary to retract the edge of the sterno-mastoid, and with it the external jugular vein at its junction with the left subclavian vein. The tumor was now uncovered from connecting tissue, and found to be about as large as a filbert. It lay between and behind the two primary trunks of the brachial plexus, near the transverse processes of the vertebræ, and above the junction of the two great nerve trunks in the formative Y or M of the multiple brachial plexus. The subclavian artery was seen pulsating just to the clavicular side of the tumor. By careful dissection the neuroma was removed, with moderate injury of the nerve sheath of the upper trunk. No hemorrhage occurred, a drainage tube was inserted, and the wound partially closed with silk sutures, carbolic oil on lint being used for a dressing. The patient came out of his ether well.

January 15th. Patient comfortable; slight numbness in index finger, none in others.

January 16th. Wound seems to be uniting by first intention; little pain.

January 18th. Wound suppurating.

January 19th. Part of the stitches removed.

January 21st. Doing well; remaining stitches removed and drainage tube taken out; slight hemorrhage, and a few clots removed with it.

January 24th. Doing well; healing by granulation.

January 29th. Filling up rapidly from the bottom with granulating tissue.

February 3d. Dressing changed from carbolic oil to ung. zinc. oxidi.

February 4th. Up and about ward.

February 5th. Wound all healed in with a good cicatrix. No pain in wound or hand. Discharged, relieved, three weeks after operation.

Dr. Cutler, pathologist of the hospital, reported: microscopic examination of the tumor showed it to be made up of spindle-shaped and stellate cells, united by their prolongations, and imbedded in a homogeneous, slimy, translucent matrix. Addition of acetic acid caused the matrix to become granular. Numerous intersecting bands of fibrous tissue were also met with, and in certain places made up the bulk of the tumor. The cells were spindle-shaped, and arranged in bundles, with no intercellular tissue.

Diagnosis: Myxoma Fibrosum. Prognosis for non-return favorable. Two months later the arm was free from pain. The numbness of the finger gradually disappeared. When last seen, ten months after the operation, the arm and hand were well, and used daily. He complained, however, of pain near the right sciatic notch.

Case II. — It is not always possible to remove such tumors without permanent injury from dividing nerve trunks. Some ten years since I operated on a painful tumor in the subclavian triangle of a young woman, where, after thorough dissection, the tumor was found imbedded in nerve tissue, which ran through its base. In removing it the nerve trunks were so injured that permanent musculo-spiral paralysis ensued. The pain was relieved.

Recurrence of neuralgia is to be apprehended after removing a neuroma, and also after dividing or excising painful nerves; as an instance of the latter, cases of operations on the inferior dental and infra-orbital nerves might be cited.

Case III. — A sad case of the former exists in the person of a child, now grown up, who underwent amputation at the

middle of the arm for railroad injury. Neuralgia of the stump ensued. I dissected away a bunch of neuromatous tumors from the brachial plexus. The pain, relieved for a while, returned in a few months, and was accompanied by distressing retraction and inversion of the upper end of the humerus. At a second operation I disarticulated at the shoulder-joint, and also dissected away all the nerves in the axilla. Relief followed, but in six months neuralgia recurred in the scapula. Such cases afford but little hope of permanent cure.

V. NASO–PHARYNGEAL POLYPUS.

Case I. — *Naso-Pharyngeal Polypus; Removed by sawing down and depressing the Nose.* — This rare and interesting case was a boy, 15 years of age. Symptoms of obstruction of the right nostril and pharynx had been present over a year. Eight months previously a pear-shaped, fibroid polypus was removed by Dr. Mason, of Providence, by means of a looped ligature passed through the nose. The tumor soon reappeared. It could now be seen hanging down behind the soft palate. It nearly filled the pharynx, and the right nostril was obstructed. It was decided to attempt its removal by Ollier's operation, in preference to either Langenbeck's operation or my own, which is done by displacing the jaw.

Operation, by Dr. Cheever. — The patient was etherized. Starting at the root of the nose, over the frontal bone, midway between the eyes, an incision was made downward and outward by the side of the nose to the alar cartilage. A similar cut was made on the other side, both incisions reaching the bone. The blade of a small, straight saw was then laid flat on the forehead, and the nasal bones and vomer were sawed through down to the alar cartilages. The nose was now easily upset, and turned down upon the mouth. Next, the vomer was broken and bent by the finger over to the left side, and the inferior turbinated bone was cut away with bone forceps. There was now room enough in the left side of the nares to reach the tumor with the finger. It was found to be attached by a broad root to the body of the

sphenoid and to the right palate bone. It was scraped off the bones by the periosteum scraper. Aided by the finger in the mouth it was delivered whole, and proved to be an oval fibroid, as large as a pullet's egg. The surface from which it grew was touched with nitric acid.

The nose was now replaced, and the nasal bones were wired to the face by two wire sutures; the skin being carefully readjusted with one wire and seven silk sutures. It fitted perfectly. The nose was still farther supported by a horizontal strip of adhesive plaster.

Subsequent History. — November 3d, day following operation, comfortable. Nose warm. General temperature 99° F.

November 4th. No pain. Nose warm.

November 7th. Four external sutures cut. Slight discharge around wires. Drops of perspiration on nose.

November 8th. Remaining skin sutures removed. Wound nearly healed.

November 12th. Deep wires removed. Fair union of nose; can be shaken easily, but adheres in position. Very little discharge.

November 15th. Up and about. Scarcely any discharge. No deformity.

November 20th. No discharge. Excellent result. Nose straight and perfect. Two linear scars on either side. Nares and throat clear and well. Voice normal.

November 26th. Patient was discharged well.[1]

Case II. — *Naso-pharyngeal Polypus; Depression of Superior Maxilla; Replacement; Recovery.* — The patient, a young man, 21 years old, began to notice difficulty in breathing three years ago. Obstruction began on the left side of nose. Frequent epistaxis. Both nostrils are now stopped up by a hard, firm tumor in upper part of pharynx.

August 31st, 1877. He was etherized, and Dr. Thorndike

[1] A previous case operated on by Dr. Cheever in 1867–68 is detailed in the First Medical and Surgical Report, Boston City Hospital, 1870. For description of Ollier's own cases, see his work, Traité de la Régénération des Os, par L. Ollier, chirurgien en chef de l'Hôtel Dieu de Lyon. Paris, 1867.

removed the growth. Ferguson's incision was made on the left side of the face. The superior maxillary bone was sawn across below the malar bone, and depressed. The tumor was detached with scissors, with some difficulty, owing to its broad and firm attachment to the basilar process of the occipito-sphenoid bone. The base of the tumor was thoroughly cauterized with nitric acid. The upper jaw was replaced and secured with a wire suture, by drilling the bone. Wound of skin closed with sutures and dressed with cold water. The patient had vomiting and considerable prostration after the operation. A chill on the fifth day. Pulse one hundred and sixty and intermittent. Soon after began to improve, and sat up in eight days. The wound united by first intention. The jaw solidified soundly. He was discharged from the hospital in two weeks.

Four years afterwards he remained well.

Case III. — *Naso-pharyngeal Polypus; Depression of Superior Maxilla; Replacement; Recovery.* — The patient, a boy of 16 years, enters the hospital with the following history. In 1875, a polypus began in his nose. In 1878, it had reached the size of an English walnut. It was then removed by the galvano-cautery. It soon began to grow again. Examination now shows a yellow, fibrous-looking tumor projecting from the pharynx, and hanging well down into the throat. The soft palate was pushed forward and downward. The finger could be passed behind the polypus, between this and the pharyngeal wall, for some distance, showing the attachment to be high up in the pharynx. Both posterior nares were partially occluded. It was evidently a growth from the basilar process of the occipito-sphenoid bone. But a broad adhesion between the tumor and the back wall of the pharynx could be felt high up behind the polypus. The existence of such broad posterior adhesions determined me to do the operation by depressing the jaw, rather than by depressing the nose.

The patient was etherized, and Dr. Cheever operated. A thread was first passed through the tip of the tongue and looped. Another thread was passed through the lower end

of the tumor in the throat. Both these were held outside the mouth. An incision on the left side of the face was made, beginning at the inner angle of the eye, running down by the nose, round the ala to the myrtiform fossa, and thence through the upper lip. The skin and tissues were then dissected back, laying bare the bone to the pterygoid process. The bone was sawed horizontally, in a line running from the lower angle of the nasal bone, through the antrum, to the pterygoid process. A central incisor tooth was drawn. The alveolus only was then cut through with bone forceps in the median line. The lower segment of the upper jaw was then seized and depressed, fracturing the palate process, but not severing the mucous membrane. An opening being thus made to the upper part of the pharynx, the polypus was scraped off from the basilar process and the posterior nares with a spoon-shaped periosteum scraper, on a long handle. The broad attachment to the back wall of the pharynx was separated cautiously and slowly with curved scissors. The polypus was then removed, and was of the size of a hen's egg. The bone was brought up into place, and wired with a single wire by drilling. The flap of skin was adjusted and sewed with silk; water dressing was put on. The skin united by first intention. The jaw solidified. He was discharged well in three weeks.

VI. LARYNGO-TRACHEOTOMY FOR FOREIGN BODIES AND FOR TUMORS.

Case I. — *Foreign Body; Removed from the Larynx by Laryngo-Tracheotomy.* — A little girl of $3\frac{1}{2}$ years, while playing with an oval tin stamp, taken from the covering of a parcel of fine-cut tobacco, got it impacted in her throat, out of reach. The foreign body was a flat plate, three-fourths of an inch long and five-eighths of an inch wide.

Immediate and progressive symptoms of spasmodic croup set in.

The accident occurred on the Cape, one hundred miles from Boston.

The croupy cough and spasm of the larynx continued.

She was brought to Boston by her physician, and I saw her thirty-six hours after the accident.

She was brought to the hospital and etherized. The throat was explored with the finger, but nothing could be felt. Tracheotomy was then performed, after which the tracheal incision was held open, and search made for the foreign body. It was detected in the larynx, but was so impacted that it could neither be drawn down nor moved. A soft rubber trachea tube was inserted. Portions of its horizontal plate were then cut away, to avoid covering the larynx. Next, the incision in the trachea was extended up through the cricoid cartilage and between the thyroid cartilages in their entire length, until the whole larynx was laid open in the middle line. The piece of tin was found in the glottis and removed. The thyroid and cricoid cartilages were reunited by two silver-wire sutures, the trachea tube being left in position, and the child was put into the steam room. She did well, and made a perfect recovery.

The tube was taken out on the fifth day, the wire sutures on the seventh and eighth days. By the sixteenth day the cut had closed by granulation. On that day, eleven days after the tube was removed, the child spoke distinctly, with a shrill, doll-like voice. She went home on the seventeenth day after the operation.

Previous cases of my own are reported in former volumes of these reports. A slight abstract only will be given here.

Case II. — A child of 3 years swallowed a shawl-pin with a glass head. Six weeks elapsed before its removal. In the mean time the child was constantly afflicted with spasmodic croup, and with bronchitis. It was removed by tracheotomy, and entire recovery followed.

Case III. — An infant of 10 months got a burned match in its throat. Six hours afterwards it was brought to the hospital. The symptoms of spasmodic laryngitis were marked. The throat was explored with the little finger, and nothing could be felt. Tracheotomy was performed. The

match was found in the trachea. The child died of broncho-pneumonia.

Case IV. — The larynx was laid open its entire length, in a boy of 7 years, for a polypoid growth on the vocal chord. The tumor was scraped away, and touched with chromic acid, tracheotomy having been previously performed. Recovery took place, but the voice remained impaired. The growth recurred to a moderate degree, and was finally relieved by applications through the mouth, with the laryngoscope.

Case V. — Laryngo-tracheotomy was done on a man of 55 years, for a tumor of the glottis, threatening suffocation. The growth was epithelial, and attached broadly to the left vocal chord and side of the larynx. It was removed by curved scissors and the cautery. Much hemorrhage, for such a locality, occurred. It was especially troublesome when the preliminary tracheotomy was done; the tracheal mucous membrane being extremely vascular. The patient died of exhaustion, and probably pneumonia, in about a week.

Case VI. — The larynx was laid open in a man of middle age to remove a foreign growth from the glottis. No difficulty was experienced at the time of the operation. The sides of the thyroid cartilage were wired together, as in previous cases. A low form of suppuration ensued. The wires sloughed out. A considerable portion of the left half of the thyroid cartilage ulcerated away. The wounds finally healed; and the disastrous consequences apprehended from a collapse of the walls of the glottis did not follow.

VII. SPINA BIFIDA, TREATED BY TAPPING AND INJECTION. FATAL RESULT.

The patient was an infant three months of age. Otherwise strong and healthy, and nursing a vigorous mother, it presented a soft, fluctuating tumor at the lower end of the

lumbar vertebræ and top of the sacrum. The tumor was congenital. On either side could be felt the unclosed arches of the spinal column. The lower limbs were well nourished and active. There was no impairment of the functions of the bladder or rectum.

The parents of the child had been told that it would never grow, or, if it did, it would be good for nothing. I have myself seen, however, an adult with a persistent spina bifida who had fair use of the limbs. Other such cases are mentioned, but they are exceptions.

Accidental rupture of the sac is often fatal, but sometimes produces a cure.

Some time since a new-born infant was brought to the hospital with an opening leading into the spinal canal. The sac of a spina bifida had been ruptured at birth. The parts were covered with compress and plaster; but the child died in forty-eight hours. Cerebro-spinal fluid may continue to form and drain away after an opening into the spinal canal, with fatal result. A few years ago we had a boy in the hospital with gunshot wound of the spine, through which cerebro-spinal fluid was discharged in such quantities that the bed-clothing was drenched. The boy died of exhaustion and spinal irritation. On the other hand, I had a little girl under my care at the Dispensary for pulmonary trouble. On removing her clothing I noticed over the sacrum a puckered scar, into which I could put my finger. The arches of the vertebræ had not united. On inquiry I learned that the child had been born with a large tumor at this point. At four years of age she fell and ruptured the sac. She was very sick for two weeks. Pus formed, and an abscess followed, but healed. The child recovered, with no loss of power in the limbs. This was a spontaneous cure of spina bifida, in a favorable location, where the sac contained only the filaments of the cauda equina.

In the present case three modes of treatment are open to us: —

Pressure by a spring pad, which would be very difficult to apply in so young a child. Repeated tappings, followed by pressure. In such a mode of treatment there would be

some danger from draining away cerebro-spinal fluid repeatedly.

Tapping, and a stimulant injection, as in hydrocele. The perils of the latter treatment are those of induced spinal meningitis. In the *London Medical Times and Gazette*, Feb. 2d, 1878, are reported by Mr. Gould fifteen cases of spina bifida treated by tapping, and injecting the sac with iodo-glycerine. Of the fifteen cases twelve are reported as successful. One child of eighteen months was tapped and injected five times, and finally recovered. On one occasion two and one-half ounces of fluid were withdrawn with safety. It is claimed that iodine dissolved in glycerine, being heavy, remains at the bottom of the sac, and does not spread up the canal.

In the present case the sac was aspirated, and three drachms of clear cerebro-spinal fluid drawn off. Half a drachm of water, containing two drops of tincture of iodine, was then injected, and compression applied. Eighteen hours after the operation the child was seized with convulsions, followed by comatose symptoms and death.

VIII. EXCISION OF THE LOWER END OF THE RECTUM.

Case I. — *Epithelial Cancer of the Anus.* — The patient, a German, between 50 and 60 years of age, had been suffering for two years from a rectal affection. The anus was surrounded by a deep-seated, hard ring of tissue, ulcerated, watery, and bleeding, and extending mostly no higher than half an inch into the bowel; but at one point a spur ran up over an inch. There was no marked stricture; no piles; no history, or signs of syphilis. It was decided to excise the skin, mucous membrane, both sphincters, and a bit of the bowel. On one side, toward the right ischio-rectal fossa, the cut was made deeply, but not up to the peritoneum. The disease having been removed, the mucous membrane was stitched down to the skin, except at one point on the right, where the mucous membrane could not be drawn down.

The parts healed mostly by granulation, and subsequent

contraction restored the power of retaining the fæces. The patient left the hospital relieved.

The only other alternatives here would have been the galvano-cautery, or curetting. Neither would have removed the deeper induration.

Case II. — A young man, with a history of syphilis, presented an enormous mass of vegetations encircling the anus. They did not enter the bowel. He had had specific treatment and applications of calomel and of iodoform previously. At a first operation the mass was burned off with the galvano-cautery. It soon recurred. At a second operation a large circle was dissected away all round the anus, including the margin of the bowel. The mucous membrane was stitched down all round. He made a complete recovery.

IX. VENTRAL RUPTURE THROUGH A SINUS.

A feeble girl, of 10 years of age, was brought into the hospital in a collapsed condition. Over two feet of the small intestines were lying out on the skin of the abdomen. They were not strangulated; were congested; pink in color, and glued together with recent lymph. The opening through which they emerged was on a level with, and two inches to the right of, the navel. It had rounded, thin and red edges. It admitted the finger easily. There was an old sinus, opening just above the posterior superior spine of the ileum. There was an angular curvature of the spine in the middle of the back. There was no history or appearance of a cut, wound, or blow.

The sinus was slightly enlarged with the knife, the bowel washed with warm water, uncoiled, and returned into the abdominal cavity. The wound was compressed with a sponge and bandage.

The child recovered.

SYNOPSIS OF GYNECOLOGICAL CASES

TREATED IN THE BOSTON CITY HOSPITAL FOR FIVE YEARS PRECEDING JAN. 1, 1881.

Reported by G. H. Lyman, M.D.

As the service devoted in this hospital to diseases peculiar to women has been rapidly increasing since 1875, with a manifest tendency to future development, it is worth while, for the information of the Trustees of the institution and for the profession, that the published Hospital Records should contain a concise report of the work of the past five years. This service having no separate staff, but being participated in by all the regular visiting physicians, the records are more or less perfect in proportion as they have been interested in gynecological matters, some devoting more of their time and others less, to this particular class of patients. As the service becomes more systematized, the records, doubtless, will become more detailed, more reliable, and more useful.

In this paper only such of the cases will be summarized as were distinctly gynecological, that is to say, only those in which this element was manifestly the "*fons et origo*" of the disorder for which the patient sought relief. Were all the cases of pelvic derangement which have been treated, incidentally as it were, to be included, the narrative would require more time and space than are at my command.

In this connection it is also to be noted that this report deals only with such cases as were admitted to the hospital, the progress and treatment being under daily supervision. The larger number treated in the out-patient department, applying irregularly, the conduct and treatment being comparatively under little control, are of less value for professional record.

Few women enter a public hospital for acute diseases, and fewer still with chronic ailments, in whom functional disturbance of the pelvic viscera is not an important factor in the problem presented; but such cases are more properly reckoned with the diseases of which they are merely symptoms, more or less important, as the case may be. The menstrual derangements, for instance, accompanying inflammatory disease, and due to deranged circulation, are excluded; while the inflammatory and reflex disorders of the circulatory and nervous systems, directly excited by local pelvic disturbance, are, properly speaking, gynecological, in the sense in which that term is here used. No one familiar with the rapid development of this branch of general practice can fail to recognize its grave importance in connection with the diseases of a large half of the human race; and if our hospitals are to do their work intelligently and economically, and, above all, with the greatest ultimate benefit to the usefulness of our sick female poor, this consideration should have its full influence upon all governing bodies of such charities. The prime motive, doubtless, is that the patients shall be so treated, if possible, as to enable them to attend to their domestic or other employments, to earn their own living. It is of little use, for instance, to admit a woman suffering from chronic endometritis, and give her only that temporary relief to her leucorrhœa, irritable bladder, and general pelvic distress, which mere rest alone will often afford, and then send her back to her daily work, with the certainty that she will soon relapse and be as helpless as ever. To treat such cases, economically for the public charity, and usefully for its recipients, the cause must be removed, the pelvic organs must be restored to their normal condition, if such restoration be practicable.

This, of course, requires not only the proper appliances and the separate arrangements of a distinct gynecological ward, but a larger consumption of the time which can be daily afforded from other patients on the part of the visiting staff. The first steps to some organization in this direction were undertaken, timidly and reluctantly at first, by our late energetic superintendent, Dr. Cowles, under direction of the

Trustees, and before his resignation, with a degree of good will and assistance which was a constant encouragement, as results became more and more manifest. It is far yet from being all that it is capable of being, and should be, made; but enough certainly has been done to show that the Boston City Hospital intends to be always in the fore-front in every improvement in economical administration, consistent with the scientific treatment of the sick poor, for whose benefit it was established, and for whose comfort and relief the city has always cheerfully dealt with a bounteous hand.

So pressing has the need for special treatment of this class of cases become, and so necessary for every hospital which claims to be more than an almshouse infirmary, that all the largest and most important of the hospitals in Great Britain, and many of those in this country, have established separate wards for the purpose, and many of them a distinctly separate service, — a result which all will doubtless sooner or later achieve. In the short period covered by this report nearly eleven hundred cases, distinctly gynecological, have been treated; that is to say, cases in which the local lesion was the direct cause of the disability and suffering, excluding a larger number in which the local lesion was symptomatic and of secondary importance in the treatment, such as pulmonary, cardiac, gastric, and rheumatic affections, diseases of the nervous centres, and the whole category of febrile affections.

PUERPERAL AFFECTIONS.

Of primary importance are the puerperal affections, such as labor, pregnancy, miscarriages, etc., as being the originating cause of a very large number of those disorders which will be comprised in this summary.

CASES OF LABOR.

As it is not the purpose of the hospital to admit cases for confinement, the number of labors has not been large; but, notwithstanding the restrictions, seventy cases of emergency have occurred, in which humanity forbade a refusal.

As illustrative of these emergencies, one was taken suddenly while riding in a carriage, and was delivered before

she could reach the hospital; in one, labor came on without warning, and she was delivered in the street; one was delivered of a seven months' child, unexpectedly, in the water-closet of a store, having but a single pain; several were brought by the police either during or immediately after labor; one was admitted for other injuries caused by a drunken husband, and soon resulting in labor; others for convulsions or post-partum hemorrhage; and still others for lacerations or other injuries resulting from labor just completed. Of the whole number, four resulted fatally, of whom one was admitted with fever a week before delivery; one, a single woman, was admitted with symptoms of paralysis before her full term; one, a single woman, was brought by the police three hours after delivery; and one, delivered a week previously, had rupture of the uterus. Among the recoveries seven had puerperal septicæmia, and were treated with intra-uterine douches, quinine, etc.; all of these septicæmic cases were delivered in the hospital, but with such antecedents as to make it very doubtful, to say the least, whether the development of the disease could be fairly attributed to the hospital atmosphere.

The forceps were required in but two cases, and version in one. Twenty-six were single, and two, twenty-one and twenty-three years respectively, "claimed" to be widows. One, a school girl of fifteen, who had never menstruated, had an easy though prolonged labor of nineteen and one-half hours. Nine of the cases had rupture of the perinæum; six were sutured successfully, and one failed of union. One of those not sutured had septicæmia.

PUERPERAL SEPTICÆMIA.

Sixteen cases of puerperal septicæmia, the patients having been previously delivered at or near full time, are recorded: one of these was admitted delirious, only a few hours after her delivery of a seven months' child, which, in her delirium, she subsequently killed. Though thoroughly poisoned by the disease, she eventually recovered under quinine, intra-uterine injections, etc.; another, delivered twenty-four hours before admission, had complete rupture of the perinæum. This

case resulted fatally, and the autopsy by Dr. Cutler revealed gangrene of the uterine mucosa, with a "thin, false, grayish membrane, suggestive of a diphtheritic process." From the records, it is doubtful if the injections, which were used in this case, ever penetrated the uterus. The other cases had all been delivered from five days to four weeks before admission.

Of the whole number, five died, — one complicated with phlegmasia alba dolens; one, a single girl of seventeen, had, after delivery, been turned into the streets by her father, where, after long exposure in the snow, she was rescued by the police.

Several of the recoveries, also, were desperate cases; and the favorable result, as would appear from the records, was undoubtedly greatly influenced by the free use of intra-uterine injections. Other cases of septicæmia following abortion will be found recorded under that head.

ABORTION.

The cases of abortion are seventy-six in number. Seventeen of these were single, five widows, fifty-two married, and two not recorded. There is reason to suppose that a much larger proportion were unmarried, but not willing to acknowledge it, and the same doubt is probably justified as to the causes given by them; although, as will be seen, eighteen of the number had no hesitation in confessing criminal intent, giving details, not only of the crime, but often of the criminal, — a striking evidence, if any were needed, of the laxity of the law as to irregular practitioners; for, so far as appears, but one, whose victim was a school girl of sixteen, was ever convicted. Of the eighteen alluded to seven were single, two widows, and nine married. Still, a large proportion could undoubtedly be traced to overwork, falls, lifting, and other accidental causes. There were seven fatal cases to sixty-nine recoveries. Of the seven fatal cases one was delirious, and collapsed when admitted, abortion at four months and fatal from sepsis; one delivered at seven months, after four months of vomiting; one of sepsis, the placenta having been retained three months; two of peritonitis, and

two of sepsis, admitted with the disease well advanced, the autopsies revealing lymphangitis. Of the recoveries, nineteen were admitted with retained placenta, seven with excessive hemorrhage, three with septicæmia, and three with peritonitis. Of the cases of retained placenta, in several a considerable time had elapsed since the abortion; in one case, already mentioned, three months, and fatal from sepsis; in others, one retained ten weeks, five six weeks, one seven weeks, two four weeks, two three weeks, and two two weeks, — all of which eventually recovered. The fatal case was admitted in a state of collapse, with offensive placental tissue protruding from the os.

In nothing has the improvement in the management of post-puerperal diseases, of late years, been more obvious than in the use of intra-uterine injections. Cases formerly hopeless are now managed with confidence and success. Septic absorption from unhealthy conditions of the uterine mucosa, from abrasions and lacerations of the cervix, vagina, and perinæum, is forestalled, or kept in subjection; and, though not so successful when lymphangitis or peritonitis has already supervened, this form of antiseptic treatment is an invaluable resource against further absorption, as the system will often tolerate and recover from a certain amount, if the supply be cut off.

PHLEGMASIA DOLENS.

Two cases of phlegmasia dolens were admitted two weeks after labor, in one developed on the second, in the other on the ninth day, after confinement. In neither were pelvic complications noted, being probably so obscure as to be overlooked. Other cases developing in the course of septicæmia are noted under that head.

DISORDERS INCIDENT TO PREGNANCY.

For disorders "incident to pregnancy" fifty-two cases were admitted, — five with albuminuria, of whom one died soon after entrance of convulsions, at nearly her full term. Nine had hemorrhage, threatening abortion, none of whom so far as discovered had placenta previa; nineteen sought re-

lief for excessive vomiting; one had paralysis supervening at the eighth month; two had acute chorea; two had neuralgia; one, single, age twenty-three, was salivated by medicine taken unsuccessfully to induce abortion; two had accidental injuries threatening abortion, and others entered for pruritus, vulvitis, etc.

All but the fatal case of convulsions were discharged relieved, to await their confinement elsewhere.

ACUTE CHOREA.

Of acute chorea there were thirteen cases, eleven discharged well, and two relieved. Of these, eight were school girls, from six to sixteen years of age. Two were attributed to over-study; one to fright; one to tape-worm; one to indigestion; one, twenty years of age, to "irregular habits;" and one each to previous attacks of rheumatic fever and cerebro-spinal meningitis; a considerable proportion of which only are to be reckoned, strictly speaking, as "gynecological."

HYSTERIA.

Of hysteria there were eighty-three cases, forty-eight single, nine widows. In twenty-four the catamenia were irregular; one, single, was due to excessive coitus; four to suppression from cold while menstruating; three traced to previous induced abortions; fifteen, all single, to futile attempts to induce abortion, and one to fright. A large number are doubtless reported as hysteria as a matter of convenience, being cases of irregular nervous action, depending more or less upon pelvic disorder, though without any very definite or positive symptoms, and requiring merely temporary treatment and rest with tonics.

VAGINISMUS.

Of vaginismus one case only is given, a young married woman, who had been twice operated on elsewhere without relief. Some benefit followed gradual dilatation with glass plugs, but she left before the treatment was completed.

MASTITIS.

Of mastitis eight cases are given; three relieved by strapping, the rest, advanced to suppuration when admitted, were relieved by incisions.

CYSTITIS.

Cystitis, so frequent an accompaniment of pelvic disorders, has been of course a common occurrence, but there were six cases not reported under other heads, in which it was the chief factor. One had a history of old pelvic cellulitis and retroversion, the only fatal case; one dated from an induced abortion, eighteen months before; one, due to calculus, was relieved by extraction of the stone through the urethra; and in one the inflammation followed the removal of a hydrocephalic child, ten months previously, the child weighing nineteen pounds thirteen ounces, and requiring decapitation.

VAGINITIS.

Of vaginitis twenty-four acute and sixteen chronic cases were treated; of the acute sixteen were single, six married, and two widows. Two were caused by felonious assaults (one of them being in a child of eight years of age), and one resulted from a "stick penetrating the vagina while coasting," some time previous to entrance.

CARUNCLE, PRURITUS, VULVITIS.

Caruncle of the urethra, relieved by operation, and pruritus of the vulva, are each represented by a single case, and simple vulvitis by four cases only.

ABSCESS OF LABIUM AND VAGINA.

Of abscess of the labium we find seven cases, one resulting from recent parturition; the remainder due probably to coition.

Of abscess of the vagina (within the sphincter) one case was received, a recently married woman of twenty-two, noteworthy as having a double uterus, with single cervix.

ENDO-CERVICITIS.

Among the most frequent of the affections of the pelvic organs which the physician is called upon to treat in private practice, as well as in hospitals, must be reckoned endo-cervicitis. Of this disease one hundred and one cases were admitted, in which it was the chief cause of disability. This does not include the larger number of cases treated only incidentally, as symptomatic of graver trouble, such as lacerations, endometritis, subinvolution, cellulitis, and pelvic peritonitis.

The direct cause is not always easy to trace. General ill-health, the use of sewing-machines, constipation, the practice of abortion, over-work, chill during menstruation, excessive coition, in a word, any cause of disturbed pelvic circulation may induce it. Among the laboring poor, who are unable to favor themselves at the catamenial period, who can spare little or no time from their duties for child-birth, few escape it. Although coition is a common cause, injustice no doubt is often done by unfounded suspicions of impure connection. This remark is especially applicable to the large number who support themselves as sempstresses; women compelled to sit in a cramped position for long periods, who resist the inclination, or are deprived of the opportunity, for attention to the bowels and bladder; or shop-girls, who are compelled to stand with little intermission throughout the day, in a close, furnace or steam-heated atmosphere. Under such conditions, exaggerated local congestions can hardly be avoided, for one week at least out of every four.

For such, hospital treatment, with its facilities for rest and local applications, becomes essentially necessary; and we may add, where they can give the requisite time for treatment, it is very successful. Few have the means, or the necessary privacy in their confined lodgings, for its proper management, and must either have such provision made for them, or drag along in weariness and discomfort until they become a public burden, or something worse. These cases are, as a rule, discharged from the hospital well; although, occasionally, impatient of the delay and relieved of the more urgent symptoms, they are discharged at their own request.

OVARIAN DISEASES.

The ovaries were the principal seat of disease in twenty-five cases. Of these, nineteen were cases of ovaritis, of which six were traced directly to chill during the menses, and four to sexual excesses.

Two cysts, supposed to be in the broad ligament, were cured by tapping through the vagina.

One, with an ovarian cyst, died of pyelo-nephritis five days after entrance. One, with a dermoid cyst, twelve ounces of "fatty fluid" mixed with hair being drawn by tapping, left before farther treatment.

One case of prolapsus of the ovary was entirely relieved by a thick pessary, and one case only of colloid cancer of the ovary is reported. This last had every characteristic of a multiple fibroid when admitted, and the admission of the sound four and one-half inches determined an erroneous diagnosis. The autopsy revealed the body of the uterus of normal size and length, the *apparent* elongation consisting of the supra-vaginal portion of the cervix. For this error the present reporter alone is accountable, and calls special attention to the cause of it, as one not commonly alluded to in the differential diagnosis.

HEMATOCELE.

Six cases were admitted with hematocele, and resulted favorably. Four of them were opened, of which one had also a spontaneous opening into the rectum. In the aspirated cases suppuration had occurred, and the constitutional irritation was only allayed by removal of the sanious contents, and injections of iodine or carbolic acid.

Beside the above-mentioned six cases, it is quite probable that others were recorded as pelvic peritonitis or cellulitis, as many of the cases so recorded entered the hospital after suffering for long periods with pelvic effusions, and unable to describe their earlier symptoms with sufficient clearness to render an exact differential diagnosis possible.

PELVIC EFFUSIONS.

One hundred and forty cases were admitted with other pelvic effusions. Unfortunately, an exact differential diagnosis is wanting in many of them. This, doubtless, was sometimes unavoidable; but, after careful scrutiny of the records of each case, the following summary is thought to be substantially correct; that is to say, of pelvic peritonitis, one hundred and five; of pelvic cellulitis, thirty-five. Of the first a large number had simple effusion into Douglas's pouch, or into the lateral parts of the pelvis, resulting from cold, over-exertion, excessive coitus, bathing during the menstrual period, induced abortion, and arrested involution from various causes after delivery. The most common causes noted appear to have been chill during menstruation and excessive coitus.

Of the one hundred and five cases of pelvic peritonitis seventy-two recovered, and thirty left before entire recovery, generally convalescent. Among the recoveries eighteen had resulted in abscess, twelve of which were aspirated, and five opened spontaneously in the vagina, rectum, or groin. Of the three fatal cases one died of septico-pyæmia, the evening of her admittance, the autopsy revealing, besides the peritonitis, a laceration of the vagina; one was admitted much exhausted, with extensive effusions and an abscess in the groin; and of the third death there are no particulars, farther than that she was aspirated through the vagina.

Of the thirty-five cases of pelvic cellulitis sixteen recovered entirely, two died, and the remainder left before entire recovery, so far relieved as to be impatient of longer confinement. Of those discharged well, or relieved, resolution took place in seventeen, and eighteen resulted in abscess, of which eleven were aspirated, and seven opened spontaneously before or immediately after entrance, two of them into the rectum, one into rectum and vagina, one into rectum and groin, one into the groin, one into the vagina, and one into the bladder.

Of the two fatal cases one entered exhausted, with suppuration in the groin and into the rectum, and the other

revealed at the autopsy an extensive parametritis of long standing; aspiration was too late to be effectual.

As a rule, the local treatment of all these cases resulting in actual pelvic abscess, whether originating in hematocele, peritonitis, or cellulitis, was (in cases accompanied by offensive discharge or showing a tendency to reaccumulate) — by repeated injections of the sac with dilute carbolic acid or iodine, with due provision for proper drainage. No doubt many fatal cases occur from not opening sufficiently early. Aspiration should be resorted to as soon as it is reasonably certain that suppuration has occurred, and especially when the local tension is accompanied by severe constitutional irritation, and cystitis or rectitis. The relief is usually immediate, and in a large proportion of cases the result successful.

The following, as among the probable causes recorded, are worth notice: in one, the recent use of the sound for restoring an anteflexed uterus; in one, the free use of a sound in the treatment of sterility some time previous; in three, lacerated cervix; in two, recently induced abortion; and in one, there were suspicions of extra-uterine pregnancy. It is worthy of note, as a matter of prognosis, that out of this large number of pelvic effusions, either from hematocele, cellulitis, or peritonitis, so small a number should have terminated in suppuration. So far as concerns peritonitis and cellulitis, no doubt that effusion is even more common in general practice than these figures would indicate, but escapes observation from want of careful attention to the symptoms and the neglect of vaginal examination.

The remarks made above as to the differential diagnosis between hematocele, pelvic peritonitis, and pelvic cellulitis, are equally applicable to the cases of chronic metritis, endometritis, and hyperplasia of the uterine mucosa; but an analysis of the records would divide them with probable accuracy into twenty cases of chronic metritis, and forty of endometritis, including those of hyperplasia. The cases of acute metritis are reported under the various heads of abortion, septicæmia, etc.

The supposed causes were chiefly suppression of the menses, displacements, lacerations of the cervix and peri-

næum, the sequelæ of induced abortion and subinvolution following labor, and of more or less remote origin. None of the sixty cases terminated fatally, the local treatment consisting generally of scarifications, glycerine tampons and hot douches, dilatation by tents, the free use of the curette in the hypertrophic and hyperplastic cases; and, when necessary, applications to the cavity of strong solutions of carbolic acid in glycerine, subsulphate of iron, iodine, or nitric acid. Many of the cases tabulated under the head of endo-cervicitis were also more or less complicated with uterine enlargement of secondary importance.

LACERATION OF THE CERVIX AND PERINÆUM.

No systematic record has been kept of the number of these injuries, observed in the various disorders included in this report. They have, however, been of extreme frequency, and, as elsewhere noted, are an important factor in the causation of pelvic derangements; the former from the continued irritation of the everted and inflamed cervical mucous membrane, and the latter from the inevitable disturbance in the pelvic circulation arising from diminished support of the viscera, and consequent relaxation and prolapsus of the vaginal walls.

For laceration of the cervix, with eversion and abrasion of the mucous membrane, forty-eight cases were admitted. Twelve of these were operated on; two were found to be pregnant, and in a large number either the injury was of so recent date that they refused operation, or were satisfied with the temporary relief afforded by douches, scarifications, tampons, or nitric acid.

One of the operations was followed by a sharp febrile attack, with chills, but terminated favorably with perfect union. Minor lacerations, which are so common, and for which no operative interference was required, are not included in the above.

Seventeen cases are recorded in which laceration of the perinæum was the reason for admission. Seven of these were restored; three refused operation; one was pregnant; one was attacked with dysentery; and one had vesico-vaginal fistula

and atresia of the vagina from cicatricial bands, which demanded primary attention. In the others, recently confined, the time had passed for primary, and had not arrived for secondary, operation. Three of the operations involved both sphincter and septum.

FISTULÆ.

Of recto-vaginal fistula but one case was admitted; it originated in rectal abscess, the pus burrowing into the perinæum and labia, in a very unhealthy subject, and who left the hospital with but little improvement.

Of vesico-vaginal fistulæ there were three cases. One, resulting from recent instrumental labor, refused operation; one, before alluded to as complicated with rupture of perinæum and vaginal atresia, — a very large one, — was nearly closed by operation, a minute opening remaining. There were also in this case cicatricial vaginal bands, and the operation was to be repeated later, when these bands should have been softened down by the use of glass plugs, etc. The remaining case, of seventeen years' standing, having undergone repeated operations in a foreign hospital, was finally successful.

Fissure of the anus was noticed in but one case. It was of recent origin, and cured by stretching the sphincter.

ATRESIA OF VAGINA.

Atresia of the vagina, from dense cicatricial bands, occurred in but one case, already spoken of. It resulted from labor, *supervised by a midwife*, eleven weeks before entrance. The placenta was retained eight days, its expulsion being followed by incontinence of urine. On vaginal examination, a large transverse fistula, admitting the finger, was found close to the urethra, the vagina being entirely occluded beyond that point. This band was dilated, after incision, and a second one found near the cervix, through which no probe could be passed. After a month's use of a large glass plug the lower band was so far softened as to admit of operation for the fistula. As the existence of a small valvular opening in the upper band was revealed by the appearance of the menses, it was not disturbed, experience proving that, should

conception ever unfortunately occur, the constriction of itself need be no obstacle to delivery, or, proving such, may be divided at the time of the labor.[1]

POLYPI OF CERVIX.

Of polypi of the cervix six were removed, four mucous, and two fibroid. One of the fibroids completely occluded the cervix in a young married woman (a private patient), causing distressing dysmenorrhœa. Its removal gave entire relief, and a baby in ten months.

UTERINE FIBROIDS.

Of uterine fibroids there were thirty-two cases, three of which, developed within the cervix, were removed; fifteen were subperitoneal; seven intramural; four were multiple, and of two no exact diagnosis was made. One, sub-mucous, and weighing sixteen and one-half ounces, was removed. Of the whole number four died while in the hospital, viz.: one, a multiple, with sloughing of the mucous surface, died of exhaustion; one, a multiple, sub-peritoneal, died suddenly of acute gastro-enteritis; one, a multiple, intramural, was complicated with cardiac dilatation, and died of cardiac embolus; and one, aspirated through the abdominal parietes, presumably for diagnosis, died of pain and hemorrhage, the autopsy revealing an intramural fibroid localized in the posterior wall. In several cases hemorrhage was arrested by tents; while the free and long-continued use of ergot was of service in a large number of cases, by the relief of pain, and diminution in size of the tumor; though the ultimate result cannot be given, as such cases are not retained in hospital for any length of time, and they rarely return to report progress. The reporter, however, is able to give the subsequent history of one such case, which occurred during his service, three years ago. She entered for profuse hemorrhage

[1] Atresia of the Vagina, by Dr. Isaac E. Taylor, in Transactions of the American Gynecological Society, Vol. 4, p. 404. For the contrary view see article by Dr. Trask on Rupture of the Uterus, Am. Journal of Med. Sciences, July, 1856, p. 104, where out of four hundred and seventeen, six cases were attributed to this cause.

and pain, disabling her from any exertion. The fibroid was multiple, and after the os was largely dilated one of the most prominent growths was removed, and she was put upon the free use of ergot. A sharp inflammatory attack ensued, of short duration; the hemorrhage ceased, the pain was relieved, the catamenia became regular, and the tumor is now so far diminished as to enable her to do her housework easily and comfortably. Another case, worth noting, entered with a large tumor closely adherent to the abdominal parietes, which had been subjected to electrolysis by an irregular practitioner. Besides the internal adhesions, his proceedings were followed by two proliferating masses as large as an orange, protruding externally. The exuberant granulating masses were removed by ligature, and the surfaces healed kindly before her discharge.

CANCER.

Epithelioma of the vagina, not involving the cervix, occurred in two cases. One had opened its way into the bladder; the other, extending from a short distance below the cervix, posteriorly, presented a large oval mass, like an egg, separated from the rectum only by a thin layer of mucous membrane, so thin as to render operative interference impracticable.

Of cancer of the uterus sixty cases are recorded, thirty-one of them epithelioma, mostly of the cervix, and, in four instances, extending to the vaginal walls. When epithelial, and confined to the cervix, the rule has been to remove the mass, using the curette freely, followed by acids, iodine, bromine, or subsulphate of iron, and, though marked temporary relief to the pain, foul discharges, hemorrhages, and dysuria was obtained, the subsequent history of those leaving the hospital, though not doubtful, is not positively known. Eighteen, admitted in advanced stages, died in the hospital. In one case of scirrhus the hymen was found entire, though the patient had been married thirty-seven years; and in another, of similar character, both breasts had been removed twenty-seven years before, for "cancer." In another case of epithelioma, the uterus was entirely prolapsed between the thighs;

and the whole organ was excised by Dr. Blake, the patient dying of "shock."

UTERINE DISPLACEMENTS.

Uterine displacements are reported under the three heads of prolapsus, anteversion and retroversion. Of prolapsus, two were complete, and in two the cervix only was visible at the vulva. Two cases were due apparently to post-puerperal complications interfering with involution. One (complete) was caused by lifting, and was easily relieved by intra-vaginal support. One of the cases, the cervix only protruding externally, rugose and dry, and of one year's duration, was, strictly speaking, due to supra-vaginal elongation of the cervix, the sound passing four and three-quarters inches. A portion of the vaginal cervix was amputated, with the effect of diminishing the elongation above, either by contraction or by stimulating absorption, and with the result of so far relieving the patient as to keep the cervix within the vagina.

Of anteversion and flexion twenty-six cases are found. A few of these, of recent origin, due apparently to strains, falls, or other injuries, were entirely relieved by replacement and rest, and some by the use of stem pessaries or tents; but the majority obtained only the usual result of partial relief.

Retroversion or retroflexion existed in one hundred and one cases, with the usual accompaniment of excessive or painful menstruation, vesical and rectal irritation, reflex nervous disorder, ovarian, gastric, or cardiac, and lumbago. One notable case, aged twenty, was blind, unmarried, and the mother of a child four years of age.

Excepting a few cases, in which the organ was glued down by old adhesions, a suitable pessary was effectual in giving relief; and in many of recent origin replacement and rest alone were needed, with only temporary artificial support. About one-half the cases were in unmarried women, as semptresses, servants, and factory operatives.

It is much to be regretted that the records, especially the earlier ones, have not always made the important distinction which exists between version and flexion. As these terms are in many cases evidently used as synonymous, I am obliged

to report them as versions. The normal anterior inclination of the uterus may often be mistaken for a version, but, unless accompanied by vesical or other symptoms, is hardly worth attention as such; and the same is true of slight retroversions, which often exist without causing any pelvic disturbance, or requiring treatment. A true flexion, however, can hardly exist without such an interference with the circulation, with the vesical functions, or with the menstrual flow, as to cause symptoms demanding relief. So far as my own experience is of any value, I should say that anterior displacements were greatly less frequent than posterior displacements; that anterior flexions were much more common than anterior versions; and that retroversions very far outnumbered retroflexions. The importance of the distinction pathologically and with reference to treatment need not be insisted on here.[1]

MENSTRUAL DERANGEMENTS.

Menstrual derangements uncomplicated with displacements are recorded under the heads of suppression, dysmenorrhœa, menorrhagia, and metrorrhagia.

Of suppression there were twenty cases. In two of these there was suspicion of pregnancy; in two it was attributed to a sea-voyage, six and eight months previously, a not uncommon cause among emigrants; in two there was probable incipient phthisis, and six originated in exposure and chill while menstruating. One, twenty years of age, had never menstruated, examination revealing imperfect development of breasts and vulva, the uterus measuring but two inches.

Of dysmenorrhœa, nineteen cases. Ten of these were due directly to stenosis, and were treated by dilatation or incision. One was associated with membranous exudation. Of the remainder some refused local examination, and in others the cause was not positively determined.

Of menorrhagia and metrorrhagia twenty-nine cases are recorded in which the flow was not accounted for by some definite lesion, and so reported. One of these was due to

[1] See the excellent remarks of Dr. Bantock and others on this subject in the Transactions of the London Obstetrical Society for 1880, p. 188.

excessive coitus, four to chill while menstruating, five to overwork, and nine were the sequence of previous miscarriages, and subinvolution.

Under the head of menopause three cases are recorded of indefinite pain, disordered circulation, and nervous disturbance. Vicarious menstruation is reported in one case, a laundress, aged 55, who had suffered from epistaxis every six weeks, since the cessation of regular catamenia, fifteen years previously. (See also Absence of Uterus below.)

ABSENCE OF UTERUS.

Finally, absence of the uterus is represented by one case, of which the following details are given: —

F. R., aged 20, widow, was married at 14. The catamenia never appeared. Always in good health until three months before admission, since which time she has suffered from headache, pains in bones, and a sharp, piercing pain in the lower abdomen, which had increased during the previous two weeks. Has some cough and dyspnœa, and suffers from palpitation and swollen feet. Appetite good, bowels regular, micturition normal. Upon examination, the vagina was found fairly developed, but terminating superiorly in a cul-de-sac, where a small nodule could be felt, both by vagina and rectum. She says that formerly epistaxis occurred every month. Has never had any preference for the company of men, and has taken no pleasure in sexual intercourse. Headache is now her chief trouble. Three weeks after entrance she had two attacks of epistaxis, with relief, not only to her headache, but also to an extreme flatulence, which latter she says occurs every month. She remained three months and a half in the hospital, during which time she had, besides the epistaxis, one attack of hæmoptysis and one of hæmatemesis. Among other means, electricity was resorted to, with the hope of developing the rudimentary uterus, but without avail.

HIGH-PRESSURE EDUCATION; ITS EFFECTS.

By Robert T. Edes, M. D.

In private practice, that old but ever newly christened sister of debility and hysteria, successively appearing as "spinal irritation," "spinal" or "cerebral anæmia" or "nervous prostration," but now more familiarly known as neurasthenia, is only too familiar. In these wards, although the *clientèle* of the hospital does not lie chiefly among the classes where this affection is most commonly developed, it is by no means rare. Here, as well as in private, it is far from being the exclusive property of the neurologist, for it has frequently claimed the attention of the surgeon, for some affection, real or supposed, of joint or "spine," and is almost certain to have received the assiduous cares of the gynecologist, before settling down into a well-marked condition of chronic invalidism.

The description of these cases in general terms, and with a just appreciation of all the varied symptoms which may attend them, is unnecessary. The pains in back and head; the inability to read, to think, to act, and sometimes even to exist, without increasing them; the general feeling of utter weariness, of loss of interest in all human affairs; the feeble and irregular circulation, leading to coldness, objective and subjective, of the extremities, and to many other abnormal sensations, perpetuated and magnified by an attention otherwise unoccupied, are familiar to all.

These patients are not necessarily hysterical, or even "nervous," in the common acceptation of the word; but they have usually been well educated as to all the parts of their pelvic viscera which can possibly have an "*itis*" added to their names, are learned in pessaries, talk glibly of the "base of the brain," and know to the fraction of a milligramme just the dose of any drug, possibly the most feeble, which is required to produce an effect upon them.

The treatment of this affection is so largely moral and hygienic, depends so much upon the individuality of the patient and of her attendants, and has been the subject of so much literature, that I shall say nothing about it.

But my attention has been somewhat strongly directed to certain points in its etiology, which have often been the subject of professional comment, but which will bear to be again discussed and insisted upon; since, in dealing with an affection difficult and tedious in its treatment, which makes of so many, who might be among the most useful members of society, mere burdens to themselves and to the community, nothing can be of greater practical value than forcing upon the attention of responsible persons a realizing sense of its *avoidable* causes. These cases seem to originate under two almost diametrically opposite conditions, which may be briefly named, *underwork* and *overwork*. This apparent contradiction finds its parallel in the atrophy which may arise in cases having the appropriate diathesis, in those muscles which are most exposed to excessive exertion, or, on the other hand, in consequence of disuse or paralysis.

Invalids, who have become such because they have nothing better to do, have probably existed ever since there has been a class able to live without exertion, and willing to take advantage of the opportunity. The members of this class, who have felt no spontaneous impulse to work, and to whom external circumstances have furnished no definite object for labor of any kind, become the male valetudinarians and hypochondriacs, and furnish an important contingent to the array of female neurasthenics.

Among them we should find the "bed case" of the late Dr. Channing.

It is the second class, however, which appeals most strongly to our sympathies, while its existence robs the community of much more effective strength than the first.

For this class we may recognize modes of origin various in detail, but often coexisting or running into each other, and having this in common: that they involve not only mental occupation, but mental or nervous strain and tension; anxiety as well as work. It is not the steady road gait, be it fast or

slow, as individual capabilities allow, that breaks down these patients, but the *racing*, either with each other or with those indefatigable antagonists, sickness and poverty.

Many groups of circumstances may furnish these conditions: household cares, nursing, friendly or professional, or, lastly, those which are the special subjects of this paper, —

OVER-SCHOOLING

or over-study, either as scholar, teacher, or both.

The overwork is often a necessity. The future patient risks her nervous system in the cause of her friends or her family as distinctly and as honorably as the soldier risks his body for his country. It is for those who falter and fail in such a struggle that philanthropy most properly builds its hospitals and asylums; and for them, even if we consider them imprudent and misguided, we can feel only pity and sympathy.

But, in others, breaking down under the absurd regimen of many of our schools, we have to regret the meagreness of results, as well as the magnitude of the sacrifice, and share the doubts of the elder Mr. Weller in regard to matrimony, — "whether it is worth while going through so much to learn so little."

It would be difficult or impossible to show that preparation for and the practice of teaching are occupations peculiarly dangerous to nervous health. It is only under certain circumstances that they are so; but that these circumstances are of no infrequent occurrence seems a conclusion not at all difficult to draw from hospitals or from private practice.

The fact that out of nineteen patients in the Adams Nervine Asylum nine had been teachers shows possibly only a coincidence, or, more probably, that teaching is the one vocation to which more educated women who are obliged to earn their own living resort than to any other.

That out of ten of these patients, whose cases may fairly be named "nervous exhaustion," seven had been teachers, certainly shows that teaching is *one* way of breaking down nervous strength. Illustration, if not proof, may be found in

the subjoined histories, abridged chiefly from the records of this hospital, or of the institution just named.

Case I. — Miss A., aged 34. A woman of rather large frame, and at present tolerably well nourished, has been an invalid for fourteen years. At seventeen she had typhoid fever, and has not been well since.

Two years later, when teaching, she noticed a gradually increasing sense of lassitude, lack of endurance, loss of appetite, pain in forehead, back, and neck, distress in the cardiac region, and vomiting.

She is subject to attacks of greater severity, during which she is confined to bed for weeks. At these times there is a feeling of impending death; anguish, followed by extreme prostration.

She has improved somewhat within the last two years.

Case II. — Miss B., aged about 32, now tolerably plump, and of good color. At ten years old she was taken out of school sick; at fourteen, had "slow fever;" at fifteen, sent home from school sick.

After this tried rising at four A.M. Studied sixteen hours a day, taking two hours for meals and six for sleep. She kept this up for two weeks, and broke down. Studied again, became sick and delirious. About 1870, from too long walks, her legs gave out, and she could not walk.

Tried twice to teach. The last time she used to put her feet in mustard-water at night (to relieve cerebral congestion?) so that she might be able to go out the next day. Another sickness followed, with headache and "pressure."

Her present illness dates from 1874, from a short but severe mental strain (an essay on a somewhat difficult subject in one of the public schools in Boston), and is characterized chiefly by general weakness, and especially by inability to "use her head." She is improving slowly.

Case III. — Miss C. worked very hard as a teacher in a western city. Previously well, she broke down six years

ago, was obliged to give up her profession, and has not been well since.

She has no symptoms but loss of strength.

CASE IV. — Miss D., aged 23. A frail child, very ambitious and nervous. She studied until three years ago, when she graduated at a well-known female seminary.

She was troubled about her entrance examination, and soon after entering school her back began to trouble her. Has had attacks of dizziness, and two years ago had what was possibly a slight sunstroke.

She was, when last seen, a nervous invalid of the most pronounced type, emaciated, lying in a cold room with scanty clothing, and taking, to all appearances, so little food that it was difficult to understand how a normal body temperature could be approximated. She suffered intense pain in her right hand and arm.

Of her recent history I am ignorant.

CASE V. — Miss E. suffered from dyspepsia, depression of spirits, emaciation, and "excruciating" pains.

Her physician says, "She was such a wreck that when she went to Philadelphia (to be under the care of Dr. Mitchell), I was glad enough to hear that she reached the place alive." She begins her own story: "1872, Sept. Teaching in N——, with some headache. Cold house and poor food." After this, though greatly improved, there were some years of ups and downs, with sleeplessness, nervousness, indigestion, and "local" (*i. e.*, supposed uterine) pains.

Is now fat, and very much better.

CASE VI. — Miss F., of a nervous temperament, worked with great energy at teaching, and the care of her mother and sister (the previous case), until she gradually broke down and took to her bed.

While in the City Hospital she was in a condition of utter despondency, usually more or less concealed, but occasionally expressed in extravagant language, homesickness of the most extreme kind leading her to display a

degree of cunning altogether foreign to her nature. Her notions as to her dyspeptic condition and the anatomical condition of her stomach amounted almost to insane delusions, and rendered the task of properly feeding her a very difficult one.

She also is very greatly improved.

Case VII. — Miss G. In this case the breakdown, the headaches brought on by the least attempt at the mildest possible forms of so-called mental labor, the general debility, the torpidity of pathological as well as physiological processes, are, perhaps, less distinctly the consequence of school life than in some of the others, though diligent application, both as scholar and teacher, was supplemented by a tedious employment in the non-ventilated library of an eminent writer on hygiene. She improves slowly.

Case VIII. — Miss H., aged 32. There is a slight history of nervous tendency in the family of this patient. She was well until seventeen years of age, when there came three years of overwork. At twenty she was in Europe for four years of hard study. She used to go to bed at two, and get up at six for lessons. She then experienced flashes of light before her eyes, and a feeling of pressure upon the temples. A slight attack of diphtheria aggravated these symptoms.

In the spring of 1874 she began teaching in a high school in this neighborhood. She then suffered from intense headaches. She was very sleepy during vacations and when unoccupied, but afterward this condition was replaced by sleeplessness.

She has now been in bed for many months; is well nourished; and lately sleeps well, with a tolerable appetite. Her symptoms are chiefly the usual pain in head and spine, general hyperæsthesia, and constipation. She improves, and, as I have lately heard, walks a little.

Cases IX. to XIII. — Misses I., J., K., L., and Mrs. M., are all nervous invalids; all inmates of the Adams Nervine Asylum, and have all been teachers; though the

connection between their present condition and their occupation is less clear than in most of the cases just cited.

The case of one of them obtained considerable notoriety through the daily papers, as a cure by prayer and the laying on of hands.

As to the pathology of these cases it is difficult to speak, except in negations or metaphors. Morbid anatomy they have none. Frequently emaciated or anæmic; often enough, at least, to justify the treatment so widely known by the name of the eminent specialist of Philadelphia, yet all these cases do not depend upon want of fat or blood as the essential condition. Fattening may improve, but does not always cure. The hypothesis of a local anæmia of brain or cord is, in the first place, unsupported by facts; and, secondly, insufficient to account for the symptoms; and we are obliged to fall back on various ostensible explanations, which, after all, amount to but little more than stating, in various verbal forms, that the nervous centres, and especially the higher ones, fail to do their duty without rapid exhaustion, and give rise to more or less abnormal manifestations.

We have not as yet found either larger or smaller ganglion cells in these cases than in the normal brain; no fatty or calcareous or hyaloid degeneration; no interstitial hyperplasia has been shown. It is far from demonstrated that they are not supplied with blood as abundantly and of as good quality as is to be found in many other diseases attended with a much greater degree of organic mischief, and yet entirely free from the strange set of phenomena here noticed. But, notwithstanding all this, these cells will not work.

Why? I doubt if we know, until the laws of nervous force are much better understood than now; until, for instance, we can explain exactly in what consists the so-called "inhibitory" action; or can tell why one degree of irritation should simply cause increased action, and a higher degree absolute paralysis.

This latter doctrine of stimulation and over-stimulation, so necessary, so clearly, and so demonstrably illustrated in the physiology of nerves whose functions are made obvious

by muscular contractions, as the vaso-motor or motor nerves, has undoubtedly much to do in the explanation of cerebral-spinal debility. But an analogy does not give us a satisfactory answer to our questions.

The various agencies which may make so long-continued and serious a draft upon the productiveness of the nerve-cells that the supply of force is not for years again equal to the demand, or the kinds and amount of shock or strain which permanently paralyze them, have been already mentioned. The one which I have made the subject of this paper is among the most important, not only because one of the most frequent, but because avoidable; and because so much of our school system seems almost expressly designed for the manufacture of nervous invalids from material only too easily worked, and too abundant, in the form both of scholars and teachers.

Offensive though it may be to those who consider any intimation of mental or moral difference in the sexes as almost an insult to their own, the fact remains that the cases of nervous debility from this cause are very much more common in women than in men; and although of course the much larger number of women employed as teachers accounts for a portion of this difference in those whose break-down comes a few years later, and is correspondingly more complete; yet the scope of education for the two sexes is now so nearly the same, and certainly no more exacting for one than for the other, that we must suppose, for the earlier cases at least, either a relatively less power of resistance in the female, or a very different way of attacking the task.

I think we may find here a sort of paradox, and say that the break-down of many women is owing to their superior powers of endurance; that is, of endurance for a time, under nervous excitement.

A boy of moderate ability, even with some ambition, and anxious to do well, is apt soon to realize his true position, and content himself with such moderate scholastic honors as are easily within his reach, and to get his sleep and recreation even at the expense of class standing, — a philosophical procedure, in carrying out which, however, he has this immense

advantage over his sister, that he realizes at a very early age that many avenues are open for him toward success in life, and that in only a few of these is high scholarship of any advantage whatever, and in some, perhaps, even a drawback.

What we are to name that impelling force which drives on the girl to pursue her studies, and sometimes, if trying to be prudent in matters of hygiene, her sports, with a "tireless sort of energy," is not easy to say. It seems to be a compound of conscience, ambition, and a desire to please, in varying proportions with a peculiar feminine sort of obstinacy which, in a better cause, and reasonably directed, would demand admiration rather than pity.

The more sensibly conducted the studies, and the better the physical training, the better are the results. The studies of the school-girl may lead to those of the woman learning a profession, or pass into those of the "higher education." In other cases all further trouble is averted by the readiness with which all study is given up forever when the "education is completed."

The exhaustion will probably come sooner or later, but is not so likely at this stage to be permanent or complete.

For the full development of a case of neurasthenia, something more than even a first-class female conscience is usually necessary; though this, if hypersensitized, may do the whole work. An outside pressure is required, and this may come from domestic or friendly cares; but the most efficient form in which it can be applied is that to which the teacher may be subjected; and under such a pressure a very large proportion of the overworked and ambitious scholars come.

Regular and legitimate mental labor is, like any other reasonable exercise, conducive to the well-being of the organ employed, and there is no reason why teaching should not, like other intellectual occupations, conduce to health and longevity. So it would often appear to do, for, in the first place, education has not always been, and is not always, conducted with the intensity demanded in our public schools. It may be, and sometimes is, really e-ducation, — a drawing-out and developing, and not a cramming in. Or, secondly, the cares of the teacher may fall upon those happy dispositions

which shed their troubles as a duck does the water, and remain indifferent to expected praise or blame.

Those, however, who control these matters on a large scale apparently forget that the quantity of information which the scholar's mind can usefully hold does not depend upon the maximum amount which the teacher is capable of stowing away in a given time, but upon its original capacity.

Into a number of knowledge-boxes, all of varying size and shape, a certain, and usually large, amount of information on a dozen different subjects has to be packed. Fortunately many are leaky. The knowledge runs out nearly as fast as it runs in, but the box remains whole.

Those which cannot get rid of it so easily are the ones which are cracked.

A girl preparing to teach, or, what is perhaps even a more unfortunate case, an old-fashioned teacher being remodelled, has to learn (!) half-a-dozen arts and sciences, to a limited department of any one of which a man devotes his lifetime.

The highly important question of the relation of female education to the physical peculiarities of the sex I have purposely avoided, although by no means unconnected with my subject.

I cannot forbear, however, quoting the following passage from an eminent authority, as showing that nerve centres alone do not bear the whole strain of high-pressure education: —

"On looking over my case-books I have been surprised to find the same statements repeated again and again, viz., that the sufferer had taken the highest honors at some noted female school or college, and gave no tangible signs of weakness until reaction took place after her return home." — "I hold that it is not practicable to educate a girl by the same method found best fitted for a boy without serious consequences afterward."[1]

If, as I believe, our system of education is responsible, both by omission and commission, for an important proportion of the chronic female invalids, the remedies are easily to

[1] Emmett, Principles and Practice of Gynecology, 1879.

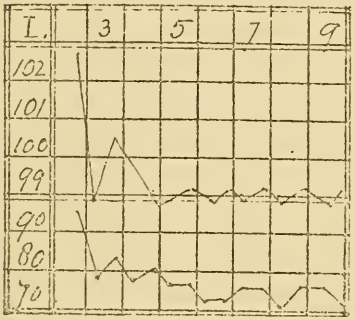
be seen, even if not so easily obtained. They are: moderate and carefully regulated bodily exercise; less studying for prizes and more for knowledge; lesser demands upon teachers; fewer scholars; and, perhaps most important of all, lucrative employments beside teaching which shall be considered respectable for women.

CASES OF DIPHTHERIA.

WINTERS OF 1880 AND 1881.

SERVICE OF HALL CURTIS, M.D.

CASE I. — G. P., 30 years old, lawyer, Beacon street. Entered City Hospital January 2d, 1880. He had within forty-eight hours lost a member of his family with diphtheria, and had been ailing some days. He had a chill, and complained of sore throat yesterday morning. Now he is drowsy, but rouses when spoken to. Decidedly nervous. Tongue heavily coated. Tonsils, soft palate, and posterior wall of pharynx highly congested. Tonsils much enlarged from chronic inflammation, and studded in patches with grayish membrane. Ice-bag to throat. Salicylic acid, four grains in water every three hours. Half a pint of milk every two hours. Half an ounce of brandy every two hours. Steam in room.



℞. Tinct. Ferri Chloridi ʒ v.
Potass. Chlor. ʒ ss.
Glycerine ʒ iii.
Aquæ ʒ vi.
ʒ ss. every three hours.

℞. Pulv. Ipecac. et Opii comp., grs. x., at night.

January 3d. Took milk and brandy well — omitted only at 2 and 4 A. M., as he said it nauseated him. Slept four hours. Pharynx is less congested. The membrane on right tonsil is thinner. No glandular enlargement. Patient feels brighter and stronger.

January 4th. Slept seven hours. Drank during night three tumblers of milk and two-thirds of a cup of beef-tea. Throat to be painted with tinct. benzoin. comp. three times daily.

January 5th. Thin gray pellicle covering right tonsil. Condition much improved. Urine: sp. gravity 1031; no albumen.

January 6th. Diet increased. Medicine every four hours. Half an ounce of brandy every three hours. Ice removed at night.

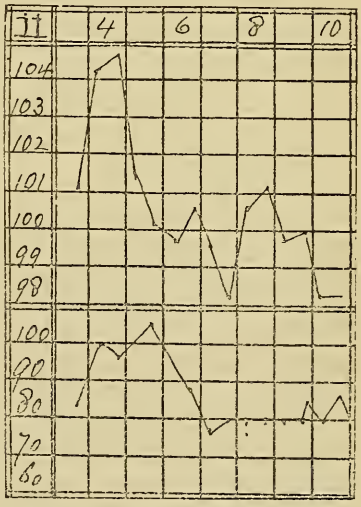
January 7th. Temperature and pulse normal.

January 10th. Throat well. Omit all ordered medicine.

℞. Quiniæ sulphatis, grains ii., ter die.

January 21st. Has continued to improve in strength, and is discharged well.

Case II. — C. A. P., brother of G. P. Entered hospital January 3d, 1880. Has not been feeling well for several days. Up much at night with the relative who died. Has lost flesh, but appetite remains good. Throat slightly congested. A small white spot on right tonsil. Temperature, ninety-nine degrees, F. At 7 P.M. had chill. Temperature after chill one hundred and one degrees.



℞. Pulv. Doveri, gr. x., at 8 P.M., and the iron and chlorate of potash mixture, one drachm every three hours.

January 4th. Fauces congested. Tonsils enlarged. A small patch (apparently false membrane) just behind left tonsil. Treatment as in last case.

January 5th. Congestion of throat diminished. Deposit entirely gone. Submaxillary gland on the right side much smaller. Urine: sp. gr. 1030; acid; no albumen.

January 6th. Chicken broth. Is doing well.

January 7th. Did not sleep well. Was in a profuse perspiration during night, for which he received

℞. Atropiæ Sulph., gr. $\frac{1}{60}$.

Salicylic acid and the iron and potash reduced, to be given three times daily. Continue atropia and morphia at night.

January 9th. Better. Right tonsil enlarged, and a granulating surface on its posterior aspect (accounting for the enlarged gland).

January 10th. Omit all ordered medicine and stimulants, except tinct. benzoin. comp. to fauces.

℞. Quiniae Sulphatis, gr. ii., ter die.

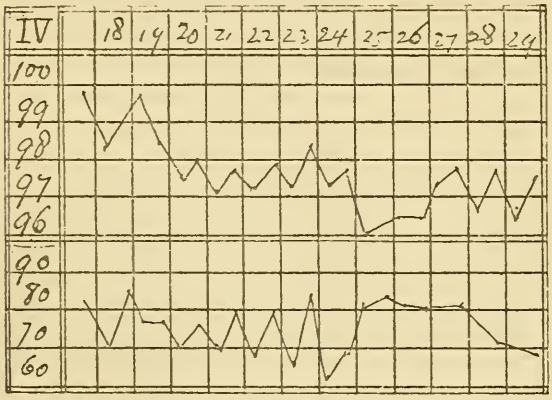
January 15th. Sitting up.

January 19th. Throat entirely well.

January 20th. Discharged, well.

Case III. — Timothy B., currier, East Boston, 30 years old. Entered City Hospital January 15th, with incipient phthisis.

February 22d. Has constantly improved until to-day, when he makes complaint of a sore throat. Diphtheritic patches are found on each tonsil. He was put into a room in the foul ward, and submitted to the usual treatment, as mentioned already.



March 1st. Doing well. All treatment was discontinued, and he was on

March 8th. Discharged, well.

Case IV. — Garnett R., 35, single, longshoreman, 29 Bennett street. Entered City Hospital January 18th. Has always been well till six days ago, when he was taken with headache and chills; "throat

began to close up," followed by cough, dysphagia, and dyspnœa. Has had but little sleep for some nights. Cough frequent. Sputum of a dirty brownish color, with flakes of white (membrane?) in it. He says the drains of the house in which he lives are in good order.

Breath is very offensive. Both tonsils are enlarged, and covered with a thick white membrane of a dirty gray color in spots.

Pharynx and uvula very much congested. Some glandular enlargement on right side of neck. Treatment as in other cases.

January 23d. Doing well. Sitting up.

January 25th. Slight deposit still remaining on tonsil, and a well-defined perforation of soft palate.

February 2d. Discharged, well.

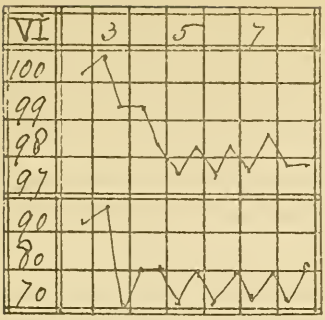
Case V. — Daniel C., 9 years old, school-boy, 122 Lenox street. Entered hospital January 19th. Has been complaining with an inflamed throat for the past week. Has been confined to bed part of the time. Tonsils much enlarged. Respiration not accelerated. Temperature, one hundred and three degrees, F. Pulse, one hundred and ten.

January 20th. At visit, temperature was 98.8. Pulse, ninety. Fauces much congested. A patch of membrane on each tonsil, and a small one on soft palate close to left side of uvula. The sub-maxillary glands on the left side are enlarged. Treatment as in the other cases, with the exception of salicylic acid, which was not prescribed. He continued to improve.

January 27th. Ordered medicine three times daily. Steam shut off. Tinct. benzoin. comp. omitted. Diet increased. May sit up.

January 31st. Discharged, well.

Case VI. — James B. N., 20; single, porter, 23 Beacon st. Entered hospital February 2d, 1880. Has always been well; was taken sick yesterday morning with fever, headache, prostration, and inflamed throat. As there had been a case of diphtheria in the house a short time before, the family sent him at once to the hospital.



February 2d. Enlargement and angry congestion of left tonsil, with what seemed to be a membrane on its posterior aspect. On the posterior wall of the pharynx was a thin patch of membrane of a dirty grayish color.

Treatment same as in the other cases.

February 5th. Membrane almost gone.

February 11th. Discharged, well.

Case VII. — Sarah P., 35, saleswoman, Ferdinand st. Entered City Hospital February 4th, with acute rheumatism, followed by acute mania; was transferred to the foul ward because of her noisy delirium.

March 1st. Much improved. No delirium, free from pain. Sitting up.

March 7th. Complains of inflamed throat.

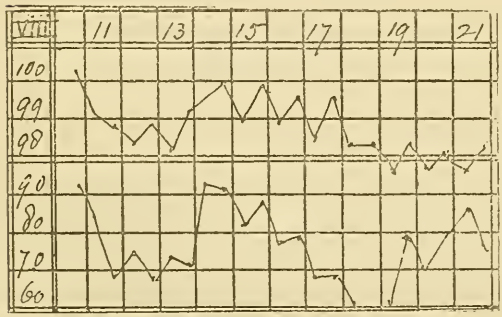
March 8th. Well marked diphtheritic patches on each tonsil. Usual treatment, without acid.

March 9th. Throat improved.

March 10th. Pains in knees. Salicylic acid, gr. x., every two hours.

March 15th. Great improvement in general health. Throat well.

March 24th. Discharged; still in an emotional state.



Case VIII. — O. W., student, Harvard College, 23 years old. Entered City Hospital February 10th, 1880. Rooms on lower story of a new college building, which is well drained; bedroom sunny, bathroom opening out of it; high, well-ventilated cellar under rooms.

Family history good. Never sick before. Three days before entrance caught cold; has had chills since. Throat became painful two days before entrance. This morning right tonsil and side of pharynx coated over with thick membrane. Pronounced diphtheritic by Dr. Wyman. He is somewhat nervous, but the general condition is good. Temperature, 98.3 degrees; pulse, ninety. Enlarged gland behind angle of jaw on the right side. Steam in room, ice-bag, and usual treatment.

Urine: sp. gr. 1003; reaction, slightly acid; color, pale; no albumen.

February 11th. Deposit increased on left tonsil, otherwise doing well.

February 12th. Deposit increased behind left tonsil. To have solid food, and three ounces of sherry.

February 13th. Had a chill last night; membrane on right tonsil thinner; spreading on left.

February 14th. Temperature has risen to one hundred and one degrees. Cough.

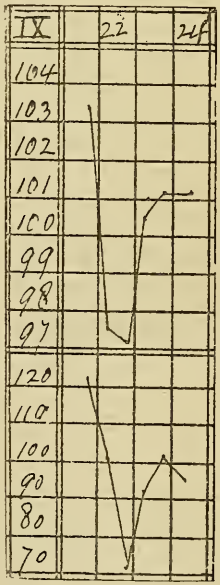
Feb. 15th. Chest normal; membrane has disappeared from left tonsil. May have a rum-bath. Champagne, a pint daily. No albumen.

February 23d. No membrane on left side; still a trace on right.

Feb. 26th. May sit up.

Feb. 28th. Discharged, well.

Seen three weeks later, health perfect.



Case IX. — C. G., 31, upholsterer, 37 Conant st. Entered hospital February 13th, 1880, with phthisis. On the 20th there were several small patches of membrane on the left tonsil, and on the posterior pillar of same side; small patch on the uvula; fauces congested; glandular enlargement on right side. Iron and potass.; steam; ice-bag; stimulants.

February 24th. Membrane has disappeared. Discharged, relieved.

Case X. — Maud M., 6 years. Davenport street. Entered February 19th. Has been sick four days with sore throat. Examination showed a thick white membrane on both tonsils. No enlargement of glands of neck. Urine: light; sp. gr. 1036; acid; albumen, faint trace; some pus corpuscles and blood; no casts.

℞. Tr. Ferri. Chloridi ♏ v.
Potass. Chlor. grs. x.
Glycerine ʒ ss.
Aq. ʒ ss.
Every two hours.

Steam; throat painted with tr. benzoin comp. Ice-bag.

February 20th. Bright; much improved, but has croupy cough and muffled voice. Three small patches on left tonsil. Right tonsil clean. Membrane to be seen behind uvula. Chest normal; omit ice-bag. Turpeth mineral, three grains, which relieved symptoms.

February 29th. Has steadily improved. Up and playing about ward.

March 1st. Discharged, well.

Case XI. — Daniel Wetmore, 8 years, Church place, Roxbury. Entered February 24th. Has had sore throat four days. Examination discloses membrane on left tonsil and behind it. Uvula is large, congested, and lying against right tonsil. Large deposit on uvula, glandular enlargement on both sides of throat. Urine: color normal; sp. gr., 1030; reaction, acid; albumen, faint trace; some hyaline and fine granular casts, pus cells and pus corpuscles.

℞. Tr. Ferri Chlor. ♏ iii.
Pot. Chlor. gr. iii.
Glycerine gtt. iii.
Aq. ʒ i., ter. die.

February 25th. Ice-bag, steam, tr. benzoin comp. to throat. Child takes milk freely, and is bright.

February 26th. General condition remains the same, throat showing thick and sloughy membrane. Lime-water spray from atomizer every three hours.

February 27th. No improvement. Stimulants.

February 28th. Died at 8.5 A.M., apparently having no dyspnœa from obstruction; but death was evidently caused by heart clot or paresis.

Case XII. — A. S., aged 28, cook at Woman's Hospital, Springfield street. Entered City Hospital February 26th. Had a sore throat four weeks ago, but recovered. Yesterday throat became inflamed, hurting her to breathe and to swallow. Right tonsil covered with a membrane, sloughy-looking in the centre. Small patches of membrane on left tonsil. Uvula red and swollen. Glandular enlargement on right side. Same treatment. Steadily improved, and was discharged on March 3d.

Case XIII. — Kate C., aged 6, entered March 2d, having been sick three days. The tonsils, soft palate, uvula, and pharynx, all covered with membrane. Glandular enlargement on each side. Same treatment, with lime-water spray.

March 4th. No change.

March 5th. The throat is almost closed with the swelling of the tonsils, and there is a dark, dirty membrane. Taken her milk well, and has but little dyspnœa. At 1.45 P.M. patient was seen to give a convulsive start and to fall back. She died at 1.55.

Case XIV. — Jessie L., school-girl, aged 10, Chelsea. Entered March 4th. Had been sick for three days with a sore throat, which caused her to breathe and swallow with pain. No chills. Feels well except in throat. Fauces slightly congested; uvula congested and elongated, with a small patch of membrane on each tonsil, more marked on the right. Glandular enlargement on right side. Same treatment.

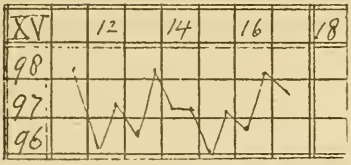
March 8th. Has steadily improved.

March 9th. No deposit.

March 14th. Discharged, well.

Case XV. — James Wetmore, carpenter, East Boston, aged 41. Entered March 11th. Father of a family of eight per-

sons. He lost one child with diphtheria, who died, in this hospital, February 27th. Another of the children and the mother then had the disease. The father and one other child then were threatened, and the whole family, being destitute, was sent to the hospital. The father complains of a sense of constriction in the larynx. He was put on diphtheritic treatment for a few days, the throat being somewhat congested. Medicine was soon omitted, full diet given, and he left the house on the 18th to seek quarters for his family.



Elizabeth W., wife, is well at present, but weak, and is put on a solution of citrate of iron and quinine.

Howard W. had diphtheria before entrance; throat now congested. Usual treatment.

Edwin W., 6 years; entered well; was not treated.

Sarah W., 8 years; died March 18th, from exhaustion following diphtheria.

The others were discharged on the 20th, all well, and were provided with clean underclothing and new clothes. They went to Eagle street, East Boston.

Case XVI. — Edwin came back on the 24th, with well-marked diphtheritic deposit on pharynx, and died on the 28th of March.

Case XVII. — Silas S., Maine, 21 years, ward-tender, City Hospital. March 13th. Patient had been in hospital one week, being a nurse in Ward K (the foul ward), where he was taken sick with a sore throat. It hurt him to swallow and to breathe. Has no chills, headache, or feeling of malaise. Posterior part of pharynx and both tonsils were found swollen and covered with thick grayish-white membrane; no enlargements of glands at angle of jaw.

March 14th. Feeling comfortable.

March 16th. Seems to be doing well.

March 18th. Membranes clearing off tonsils; but *extending down the pharynx as far as could be seen.* Takes food well.

March 19th. Sharp rise in temperature. Does not feel as well. Cough and voice muffled. Moist râles through both backs, most marked on left. P.M. Since noon has developed laryngeal symptoms with alarming rapidity, dyspnœa becoming marked. Dr. Cheever performed tracheotomy at 7 P.M. Patient died, apparently of exhaustion, at 6 o'clock, on the 20th.

Case XVIII. — Warren H., 2½ years old, a feeble-minded orphan, was sent from the Children's Home, with a history of a sore throat, and was admitted to the City Hospital on March 13th.

There was a patch of membrane on each tonsil and on the posterior wall of the pharynx. Glandular enlargement on each side of jaw.

Treatment: steam, ice-bag to throat, tinct. benzoin comp. to pharynx, chlorate of potash and iron mixture.

March 14th. Child worse — respiration becoming croupy.

March 15th. Child's condition unchanged. Laudanum given to quiet the sufferings of the child, which were pitiful to see. Died at 10.15 P.M.

Case XIX. — Fannie W., aged 17, school-girl, Wanderers' Home. Entered hospital March 14th, apparently in a moribund condition, with a temperature of one hundred and four degrees. Has been sick six days with sore throat. Examination showed the uvula, both tonsils, and pharynx covered with a dirty gray membrane, which projected forward into the mouth, and was about a quarter inch in thickness. Same treatment. Half an ounce of brandy every two hours; egg-nogg during night.

March 15th. Somewhat improved, but still very ill. No dyspnœa.

March 17th. Large pieces of membrane as thick as sole-leather removed, leaving a bleeding surface. No dyspnœa.

March 17th. Milk returns by nose. Membrane has reformed where it was removed yesterday.

March 19th. More membrane removed. Carbolic spray thrown over face, to try to prevent re-formation of membrane.

March 20th. Some improvement; less membrane in throat. Urine: sp. gr. 1033; color, normal; reaction, acid; albumen, 1½ %; blood and pus; epithelial, granular, and blood casts; renal epithelium.

March 27th. Constant improvement. Brandy, three ounces during day. Ice-bag omitted.

March 28th. Some paralysis of larynx; speech imperfect.

April 5th. Up and about; house diet; throat well; some imperfection of speech, from paralysis of muscles.

April 7th. Discharged, well.

Case XX. — March 15th. M. H., aged 22, seamstress, Lexington. Sick two days with sore throat, headache, chills, and nausea; dysphagia; no dyspnœa. A small grayish-white patch on each tonsil; glands at each side of jaw enlarged. Same treatment.

March 17th. Throat nearly free from membrane.

March 18th. Throat clean. May sit up.

March 20th. Discharged, well.

Case XXI. — Minnie McP., 2 years old, Warrenton street. Entered March 20th. A nursing child, has been sick with *sore throat three days*. There has been diphtheria in the house where she lived. A small patch of greenish, dirty membrane on each tonsil; glands at angle of the left jaw enlarged. No dyspnœa.

March 21st. No change in throat; general *erythema* (scarletiniform) on neck, breast, abdomen, and back. No dyspnœa.

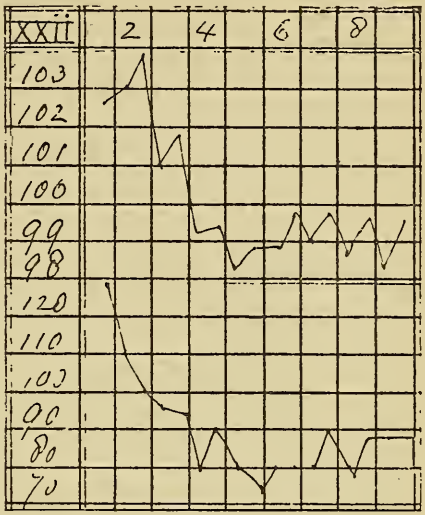
March 22d. Membrane almost gone. There was a case of scarlet fever at her house two weeks ago. Has passed no urine for eighteen hours.

March 23d. Better. No urine could be obtained for examination.

March 24th. Eruption has disappeared; passes urine freely.

March 30th. Discharged, well.

Case XXII. — Cora W., 24, single, nurse Boston City Hospital. Has had lung fever and typhoid; diphtheria about nine years ago. Had at that time a good deal of constitutional disturbance, but not a very sore throat. Admitted January 2d, 1881. Has been a nurse in Ward L (the ward for infectious disease in women) since November 12th. For the last week has felt poorly; great loss of strength; kept at her work with great languor until yesterday. Has sometimes felt as if she should fall down from weakness.



Sore throat for three days, considerable pain on swallowing, especially on right side. Some headache, with pain in back of neck and along spine. A great deal of general pain in limbs and joints. Chills for the last day or two. Nausea, but no vomiting until last night. Tongue coated. Bowels constipated; micturition normal.

Pharynx congested. Both tonsils enlarged, covered with grayish-white patches. Glandular swelling on right side of neck.

℞. Tinct. Ferri Chloridi
Potassa Chloratis āā ʒ i
Glycerine ʒ ii.
Aquæ ʒ iv.
ʒ ss. every two hours.

Ice-bag to throat (dry cold). Mustard paste to epigastrium. Throat to be painted every other hour with tinct. benzoin comp. Steam in room.

January 4th. Membrane thinner and smaller. Tonsils still much enlarged.

January 5th. General congestion of throat less. Membrane disappearing from tonsils, which are smaller. A thick, grayish-white deposit covers right side of uvula.

January 6th. Pharynx still congested. Tonsils and uvula more swollen, nearly blocking pharynx. Membrane as at last record. Same treatment continued.

January 10th. Membrane nearly gone.

January 17th. Has been slowly improving. Throat now clear. Hyperæsthesia of left side of chest and abdomen. Convalescence was somewhat retarded by an attack of urticaria. Patient was discharged, well, February 3d.

Case XXIII. — James S., 45, Ireland, laborer in Dorchester. Entered January 4th. Good family history; always had good health till four days before entrance, when he was seized with pain at the angle of the jaw on the right side. This is constant. There is no glandular swelling or tenderness externally. Deglutition is very painful and followed by regurgitation of food.

Temperature, ninety-nine degrees. Pulse, sixty-five.

Pharynx and uvula congested and swollen, covered with patches of grayish-white exudation; slight dulness at the apex of the right lung, and occasional râles of bronchitis throughout chest.

Treatment: steam; tincture of muriate of iron and chlorate of potassa; throat painted with tr. benzoin comp.

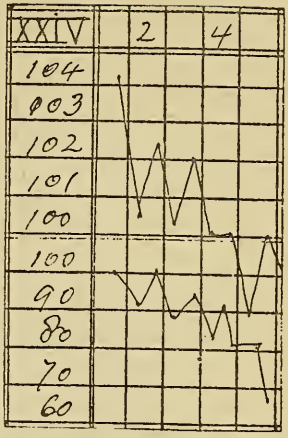
January 6th. Membrane in throat clearing up. A patch still remains, however, on the posterior part of the pharynx and on each tonsil.

January 7th. Membrane has entirely disappeared.

January 10th. Patient well and walking about ward.

January 11th. Discharged, well.

Case XXIV. —Philip H., single, aged 18, fisherman, 14 North square. Entered January 4th. Always well till three weeks ago. At that time, while out fishing, got wet and took cold, which was followed by sore throat. The submaxillary glands are enlarged and tender. Deglutition difficult. Tonsils moderately swollen. Several small deposits (follicular?) on left tonsil. A large exudation covering the anterior surface of the right tonsil, while a number of small patches are seen studded over the posterior wall of the pharynx.



The same line of treatment was followed as in the other cases.

January 9th. Membrane disappearing. Patient stronger.

January 16th. Good appetite. Feels well. There is still a congested condition of throat, the right tonsil showing a patch of membrane.

January 19th. Throat improving, though there is still a whitish film on posterior wall. Complains of pain in right ear. All treatment except tincture of benzoin omitted.

January 28th. Tincture of benzoin omitted.

February 1st. A well-marked attack of measles appeared this day, confining the patient to the hospital until the 14th of February, when he was discharged, well.

Case XXV. — Wilbor C. T., aged 22, single, commercial traveller, Shawmut ave. Entered January 8th. In excellent health until two days before entrance to hospital. At that time noticed pain on deglutition. Headache still present. Vomited once yesterday. Diffuse rash on chest and abdomen, not distinctly marked. Temperature, one hundred and three degrees, pulse, eighty-five. Has not been exposed to any eruptive disease, as far as known.

Physical examination; Palatine arch and pharynx reddened; tonsils moderately enlarged; left tonsil presents two membranous deposits, each about three-eighths of an inch in diameter; right tonsil shows three or four whitish points (follicular exudation?). Treatment as in other cases.

January 10th. Only a small amount of deposit now remains on the right tonsil.

January 13th. There is still a slight exudation on left tonsil.

January 14th. All deposit has disappeared. The eruption at entrance was fugitive, and no mention of any desquamation is made in record.

January 17th. Discharged, well.

Case XXVI. — Emily N., aged 41, cook, Marlborough street. Entered January 9th. Well until two days ago, when her throat became very painful, with severe headache. Was in hospital eleven months ago with diphtheria. Has not been exposed to infection as far as she is aware.

Membranes on left tonsil and posterior wall of pharynx; less marked on right tonsil. Glands on left side moderately enlarged.

January 10th. A few small and thin flakes on uvula.
January 14th. Membrane has almost entirely disappeared.
January 17th. Discharged, well.

Case XXVII. — Joseph Heyer, 3 years. Entered hospital January 10th. When one year old had pneumonia; always has been troubled with some difficulty in swallowing and breathing. Two weeks before entrance complained of sore throat; the family physician called, said it was diphtheria. Gradual improvement until two days before entrance, when rooms in which the family lived, in the basement of a hotel, were filled with steam escaping from a boiler. The mother said that the child again took cold and was feverish. On entrance no membrane on tonsils. Temperature, ninety-six degrees.

Urine, normal.

January 11th. Small spot on right tonsil discovered. Discharge from nose, which has been present for the past three days, is increased.

℞. Tr. Opii Deod., gtt. iii., diluted.

January 12th. Spot has disappeared.
January 13th. No membrane; doing well.
January 15th. Says he feels well. Discharged, well.

Case XXVIII. —William C. Heyer, aged 16 months. Entered January 10th. Well until two days before entrance, when he was feverish; at night restless and feverish; respirations quick and short. On the day of entrance had two convulsive attacks. Slight discharge from the nose. Conjunctivæ not injected. Is still at breast. Takes food well. On looking at the throat a spot was found on the left tonsil, three-

eighths of an inch in diameter, and a smaller one on the right tonsil. Temp., 103.1°.

January 12th. Much membrane on left tonsil, moderate amount on right; membrane on left tonsil is thick, but loosely attached. Vomited medicine three times this A.M. Brandy, gtt. xx., in water, every three hours.

℞. Diphtheria mixt., ♏ 50, every two hours. Brandy increased to half drachm every two hours.

January 13th. Tonsils sheathed in thick, dark-colored membrane. The posterior wall of pharynx also covered with same exudation. Throat brawny, neck œdematous. In the evening membrane found to cover palatine arch. Cries are clear, and there seems to be no obstruction in the larynx. Sanious discharge from the right nostril last night, from both this morning.

January 14th. Death from failure of heart, at 4.55 A.M.

Case XXIX. — Annie Heyer, 13 years old. Entered January 10th. Health has been pretty good, but she is troubled considerably with severe headaches. Five days before entrance had headache and coryza. No eruption or cough. Pain on attempting to swallow. On examination, throat found to be congested, and having a patch on each tonsil about three-eighths of an inch in diameter. Temperature, one hundred and two degrees. Pulse, one hundred. Treatment: ice-bag to throat; diphtheria mixture, ʒ i., every two hours; throat painted with tinct. benzoin comp., four times daily.

January 11th. Abundant deposit of a dirty gray color on left tonsil, running back towards posterior wall of pharynx. Same on right, but less extensive; small deposit on tip of uvula; submaxillary glands enlarged. Diphtheria mixture increased to ʒ ii., every two hours. Sherry, ʒ i., every four hours.

January 12th. In addition to membrane seen yesterday there is a slight film on the posterior wall of the pharynx. Urine contains no albumen.

January 13th. Membrane on left tonsil, posterior pharynx and uvula thin and flaking off.

January 14th. From left tonsil and behind it is a bridge of membrane running on to the left side of the uvula. Small spot on right side.

January 15th. A little membrane on left tonsil and pharynx. Throat looks better generally.

January 16th. Membrane has nearly disappeared from left tonsil, pharynx and uvula; none seen elsewhere.

January 17th. Diphtheria mixture reduced to ʒ ii., ter die. Painting of throat omitted.

℞. Potassæ Chloratis ʒ ii. Aquae, ʒ viii., as a gargle. Sherry, ʒ ss., three times daily.

January 19th. Few distended follicles on left tonsil; otherwise throat all right.

January 20th. Throat doing well. No membrane, but a little follicular deposit still present. Patient sits up.

January 23d. About room.

January 25th. About ward.

January 26th. A little thickening of speech, probably from a slight paralysis. Discharged, well.

Case XXX. — Minnie Heyer, 12 years. Entered January 10th. Good health, with exception of cough, for past month. Complained four days before entrance of having a cold; two days before entrance had headache, sore throat, painful deglutition, lachrymation and slight discharge from nose, and noticed an eruption on face and chest. Was exposed to measles during the week. On inspection, pharynx and tonsils found to be enlarged and congested. No membrane. No enlargement of the submaxillary glands. Eruption dark red, discrete, elevated, and most marked on chest and arms; slightly so on face. Conjunctivæ congested. Temperature, 102.5°. Pulse, one hundred and fifteen. Urine: high colored; acid; sp. gr. 1024; albumen, a trace; fine granular casts.

January 11th. Tonsils lobulated. Three minute white points on right tonsil slightly enlarged. Tongue thickly coated. Diphtheria mixture, 50 minims every two hours. Throat painted with tr. benz. comp., four times daily.

January 12th. Right tonsil markedly enlarged, and has

on it four or five small white spots. Eruption plainly marked.

January 13th. Membranous deposit covering posterior wall of pharynx. Tonsils much swollen and with ragged edges. Considerable discharge from nose (muco-purulent). Syringed with solution of carbolic acid, 1–100, every four hours. Diphtheria mixture, ʒ iss., every two hours. Sherry, ʒ i., four times daily. Ice-bag to throat.

January 14th. Membrane covers whole posterior wall of pharynx. Several small spots on right tonsil, which has diminished in size. Discharge from nose less.

January 15th. Temperature this A.M. below normal. Feels much better. Membrane thinner on pharynx; less on right tonsil; slight amount on left.

January 16th. Membrane still visible on both tonsils and pharynx, but less extensive than before.

January 17th. Feels better. Eruption on body disappearing. Deposit in throat about the same as yesterday; but somewhat thinner and less extensive.

January 19th. Tonsils still swollen; film on posterior pharynx clearing up very well.

January 20th. Eats and sleeps well; slight film on left side of pharynx remaining.

January 23d. Sits up about an hour.

January 24th. Feels much better; slight pain on swallowing. Does not complain of throat feeling sore.

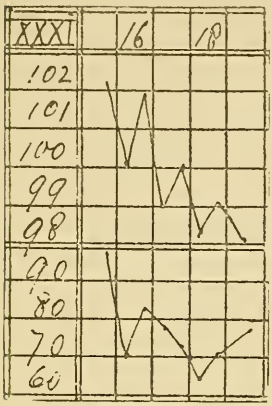
January 25th. Desquamation complete.

January 26th. Tonsils large. Slight transparent membrane on back of pharynx. Slight discharge from nose. A little deafness, which did not exist before sickness.

Discharged, well.

Case XXXI. — William B., aged 32 years, married, farmer, Newburyport. Admitted January 11th. Patient enters complaining of rheumatic pains in different parts of body. Throat all right. Four days after admission, January 15th, pains ceased. Complains of intense headache, sore throat, and difficulty in swallowing. Temperature elevated. On inspection, fauces found to be reddened, and

on the posterior portion of the right tonsil a small, white streak, suggesting membrane, is found. Iron and chlorate of potash mixture. Throat painted with compound tincture of benzoin, every four hours. Ice-bag to throat.



January 18th. Improving; throat less painful.

January 19th. White spots behind posterior right pillar of fauces. About the ward. Urine normal.

January 19th. Discharged, well.

Case XXXII. — Isabella H., aged 32 years, married, housewife, 16 South Margin street. Entered January 25th. Has had a little cough and soreness in chest for past two or three years. For the last month, cough slight, with scanty, whitish expectoration. Two weeks ago, patient's sister, who lives in the same house, was sick with a sore throat, and was attended by patient who, six days before entrance, was seized with sore throat. The first symptom was a steady, but not very severe, pain immediately under the left ear. Following this was pain on attempting to swallow solid food; later, enlargement and tenderness of submaxillary glands. Has had frequent chilly sensations during the past three days. Headache and thirst. Bowels constipated. Menstruating on entrance at the regular time; amount as usual. Temperature, 100.8°; pulse, one hundred. Diphtheria mixture, ʒ ii., every two hours. Throat painted with tr. benzoin comp. every four hours. Ice-bag to neck. On the anterior aspect of the palatine arch of the right side is a small, loosely adherent membrane; also on the left side of the arch, extending largely over the left tonsil. A thin deposit on uvula, pharynx, and left tonsil.

January 27th. Membrane much thinner; most marked on uvula; also seen on each tonsil, but to less degree than at the last examination.

January 28th. Deposit on the posterior arch of each side, but very slight; uvula as before; left tonsil nearly clear; right covered.

January 29th. Membrane chiefly on left side of uvula, and about its apex; left tonsil free; on right tonsil, and right of pharynx, a few small spots.

January 30th. Only a slight film on uvula.

February 2d. Throat clear. Urine: color high; acid; sp. gr., 1026; albumen absent.

February 3d. Discharged, well.

Case XXXIII. — Martha Nelson, aged 27 years, married, domestic, 16 South Margin street. Entered January 25th. Good health until five days before entrance, when, after sleeping with a friend who had a sore throat, she was troubled next day with several chilly sensations; no distinct chill. Noticed soreness of throat when swallowing. The day after had a small swelling under the left ear, and a severe headache. Slight hoarseness, gradually increasing, until on entrance there was almost complete aphony. Herpetic eruption on upper and lower lips, and on the lobe of the left ear. Temperature, 101.8°; pulse, one hundred and two. Diphtheria mixture, ʒ ii., every two hours. Throat painted with tr. benzoin comp. every four hours. Ice-bag to neck. Cracked ice, p.r.n.

Urine: pale; acid; specific gravity, 1030; albumen, a trace; sediment, pinkish in color, composed of urates in large amount, a few epithelial casts, and some bladder epithelium.

Left tonsil covered with yellowish membrane, extending on arch to uvula; also on right tonsil, to rather less degree. Thick membrane all round arch; also small spot on tip. Small spot on left of pharynx. Arch of palate considerably congested.

January 27th. Small amount of deposit on each side of the anterior palatine arch; also on left posterior arch, extending to root of uvula. Patient looks better.

January 28th. Deposit chiefly on left side of uvula and left tonsil. Small, thin shreds on right of uvula and right anterior palatine arch.

January 29th. Deposit size of ten-cent piece found on left side of uvula. Small points of deposit on left tonsil and left palatine arch; a few small spots on right tonsil.

January 30th. A patch, as before, on left root of uvula; none elsewhere.

February 1st. Throat clear.

February 3d. Discharged, well.

Case XXXIV. — Nellie W., aged 25 years, married, Leverett avenue. Entered January 26th. About two weeks ago had dysentery, which lasted for one week. Has always been prone to affections of the throat. On the evening before admission felt chilly; throat not sore. This morning, when she woke, throat was sore, causing great pain on attempting to swallow. Severe headache. Has felt chilly all day. Slight cough. No expectoration. Bowels constipated. Exposed to diphtheria about three weeks ago. Temperature, 101.6; pulse, ninety-nine. Urine: color, high; acid; specific gravity, 1023; albumen, absent. Diphtheria mixture, ʒ ii., every two hours. Paint throat with tr. benzoin comp., every our hours.

January 27th. Right tonsil quite ragged from old ulcer. Slight deposit at upper part of right side of uvula. Throat engorged. A little fulness at outer and right side of neck. Slight alopecia, which she says followed scarlet fever. Nocturnal periosteal pains. One miscarriage at four months. Occipital glands not enlarged. In evening, left tonsil found to have on its surface a dirty-grayish membrane, one third of an inch in diameter. Small deposit on right tonsil.

January 28th. Two very small spots on left tonsil; several large ones on right tonsil.

January 29. Left tonsil has a very small gray spot in a depression.

January 30th. Throat clear. Feels well.

February 1st. About ward.

February 2d. Discharged, well.

Case XXXV. — Emma S., aged 22, single, domestic, Kirkland street. Entered February 5th. The most prominent symptoms presented by patient on entrance were uterine. Those relating to the throat were as follows: about four days ago, the throat felt sore; submaxillary glands slightly enlarged; no exposure to disease.

Urine: color, high; acid; specific gravity, 1027; albumen absent.

On inspection, right tonsil found to be enlarged, and having on its surface small whitish spots, resembling follicular deposit. On left tonsil was a spot the size of a pea, at the upper part. Diphtheria mixture, ʒ ii., every two hours. Throat swabbed with tr. benzoin comp. every four hours. Ice-bag to neck.

February 6th. On right side of throat small spots, as yesterday; at top of tonsil becoming confluent and running across to right side of uvula. Left tonsil large, covered with deposit extending lower than that on the right. Omit ice-bag. Paint throat three times daily. Diphtheria mixt., ʒ ii., three times daily.

February 7th. Deposit on each tonsil much diminished. There remain a few spots on the upper portion of right tonsil.

February 9th. Transferred to Uterine Ward.

February 12th. Discharged, relieved.

Case XXXVI.—William McK., aged 25, single. Entered February 11th. Good health until the day before entrance, when he had a severe headache, sore throat, several chills, ringing and pain in right ear; submaxillary glands enlarged only on the right side. Swallowing causes considerable pain. No history of exposure.

Urine: color, high; acid; specific gravity, 1024; albumen, absent. Right tonsil, upper half, shows a gray deposit, not elevated, seen only on depressing anterior pillar of fauces; size, one-fourth inch in diameter. Diphtheria mixt., ʒ ii., every two hours. Throat painted with tr. benzoin comp., every four hours. Ice-bag to throat.

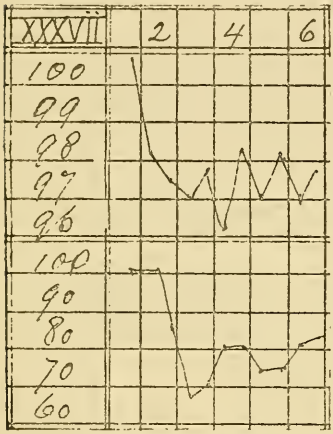
February 13th. No deposit to be seen. Throat congested. Reduce diphtheria mixt. to ʒ ii., ter in die.

February 14th. Omit ice-bag; may sit up.

February 16th. Discharged, well.

Case XXXVII. Carrie Nelson, aged 26, married. Entered March 1st. When a child was subject to fits. About eighteen months ago had diphtheria, and was, at that time,

very sick. Her brother, who also at the time had diphtheria, died. About six weeks ago, while travelling, she was exposed to a draught, and caught cold. Her throat became sore and painful on swallowing. No tenderness or enlargement of submaxillary glands. Ear-ache. Throat continued to be in this condition, at times improving and then returning to its former state, until two days before entrance, when she was asked by a friend to look at her throat, which had on the right tonsil a patch of dirty-white substance. The next day patient's throat became very sore, and the posterior nares were obstructed. Pains in both arms and legs, similar to those experienced before the last attack, transient, not severe. Following these she had nausea, no vomiting; headache and tinnitus aurium. The throat became worse towards night; tongue parched; insomnia; flitting pains through back, arms, and legs. Anorexia. Temperature, 104.8°; pulse, one hundred. On examination of throat, a small, white spot, the size of a split pea, was found at top of left tonsil, and one-third inch below this, a spot the size of a pin-head. On right tonsil a patch, not so white as the others; more diffuse; one-fourth inch in diameter. Tonsils not much enlarged. Pilocarpine mixt., ʒ ss., every four hours. When awake, sherry, ʒ ss., every hour. Ice-bag to neck.



March 2d. During last night, between 8 and 12 P.M., had frequent chilly sensations. After fourth dose of medicine began to perspire slightly; most moisture on back and legs; occasional palpitation of heart. Expectoration abundant; throat painful, but, on the whole, she feels better. Respiration regular and easy; slight cough. White spots have entirely disappeared, except one point, the size of a pin-head, on the left tonsil. Amount of urine passed, twenty-nine ounces.

March 3d. Appetite a little better; sits up; throat clear, except a pin-point on left tonsil. Throat reddened. Pilocarpine mixture omitted. Sherry, ʒ ss., four times daily.

March 4th. Sits up; throat improving.

March 5th. About room.

March 7th. Discharged, well.

Case XXXVIII. — John Warren, 2 years old, sent to the City Hospital from Catholic Home, March 4th, 1881. Was well two days before entrance. On admission, frequent barking cough. Stridulous and difficult breathing.

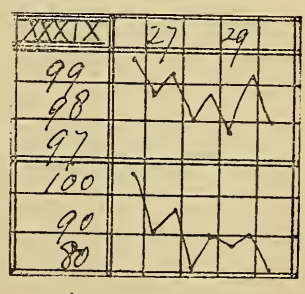
℞. Hydragyri sulph. flavi, grs. iii.

Followed in twenty minutes by free emesis, without ejection of membrane. Not followed by depression.

Treatment as in other cases.

March 5th. More restless this A.M. Supra and infrasternal *tirage* well marked. Glandular enlargement under lower maxilla, most marked on right side at angle of jaw. Head somewhat thrown back; nostrils dilated; cough still frequent and ringing. Respiration, twenty-four in a minute, stridulous; face flushed. The body, from the clavicles to the umbilicus, and laterally to the anterior border of scapulæ, covered with a brilliant, scarlatiniform flush; most marked on right half of body. Pulmonary resonance, normal. Sibilant and moist râles throughout chest (in front). The right tonsil enlarged and congested. Nothing else abnormal to be seen in throat.

Tracheotomy was done by Dr. Cheever. The child died three days later.



Case XXXIX. — Mary G., age 38, single, cook, Beacon Hill. Entered March 26th. Three days before entrance caught cold. The next day throat was slightly sore in the morning and quite sore in the evening; swallowing attended with considerable pain; no enlarged glands; slight headache; no tinnitus aurium; no nausea or

vomiting. Appetite poor; restless all night, and on the next day (the one before entrance) throat very sore; great difficulty in swallowing; could only drink milk; anorexia. Day of entrance, throat very sore; submaxillary gland on left side enlarged; stiffness and soreness in back of neck and under left ear. Chilly sensations this A.M. Temperature, ninety-eight degrees. Pulse, one hundred and five.

Urine: color high; acid; specific gravity, 1019; albumen, absent. On inspection, pharynx and fauces reddened; grayish deposit on each tonsil, half the size of little finger-nail, not elevated; also behind right posterior pillar of fauces. Two spots, each the size of a pea, on right of pharynx. Pilocarpine mixt., ʒ ss., every hour, when awake. Sherry, ʒ ss., every hour.

March 27th. Membrane less opaque and thinner than yesterday; that on left tonsil nearly gone. In evening, condition of throat as follows: two spots on right of pharynx are decidedly smaller, having diminished from edges. Ice-bag to neck. No salivation, slight perspiration.

March 28th. Nothing remains except three small spots (follicular) on upper part of right tonsil; throat somewhat reddened; pharynx clear. Sherry reduced to ʒ ss., every two hours, and Pilocarpine mixt. every four hours. In the evening nothing seen in throat. Slight salivation; profuse perspiration.

March 29th. Sits up; slight salivation and perspiration; appetite improved.

March 30th. Removed to another ward.

February 1st. Discharged, well.

Remarks. — During the months of January, February, and March, 1880, there were seventeen cases of diphtheria received. Of these two died, one case being 16 months old, the other 2 years. Of the remaining fifteen cases discharged well, one was 12 years old, one 13 years, the others between 18 and 51 years of age.

During the same months, in 1881, twenty-three cases were received. Of these four died, one case being $2\frac{1}{2}$ years old, one 6 years, one 8 years, and one 21 years. Of the nineteen

discharged well, five cases were under 10 years of age, two under 20, the rest adults.

Almost all of these cases came from houses on made land, where the soil is damp; either in the older reclaimed parts of the town, or on the newly filled Back Bay. Only two cases came from the higher parts of the town. The Report on Diphtheria, published by the Massachusetts State Board of Health, refers to this point as follows: —

"Other circumstances being favorable, a moist soil assists in spreading the disease, be the moisture a natural condition, or brought about artificially, and particularly where the substratum is of an impermeable nature."

Dr. Pinkham reports six hundred and fourteen cases of diphtheria in Lynn, eighty per cent. of which took place in valleys of brooks, in the vicinity of marshes, where the soil was damp and without artificial drainage. The immediate humidity of the atmosphere had no influence, however, nor was elevation of any account, except in determining the condition of the soil. In all the endangered places the subsoil was an impervious clay.

One group, a family of four, came from basement-rooms of a house standing on reclaimed land. Another group of six came from a marshy place in East Boston. A group of two, from a house on land made where the old Mill Pond used to be. Another group of two from a well-built house in the fashionable quarter of the city, where the land has been made within fifteen years. In this case the ice-tank of the refrigerator connected directly with the sewer.

The rooms of the Cambridge undergraduate were on the lower floor, his bedroom connected with his bath-room and water-closet.

The majority of the cases came from houses also where other cases of diphtheria, some of them fatal, had occurred.

Three cases arose in the wards for infectious diseases, two of them being nurses in direct communication with the diseases.

The cases were all treated in detached wards, divided in separate rooms, each holding from one to four beds. There were free ventilation and plenty of sunlight. The air was

constantly kept moist by steam (supplied by the heating apparatus of the hospital) forced through a cylinder packed with cotton, the latter kept wet with a solution of carbolic acid.

Food and stimulants were freely given at regulated intervals. Tincture of the muriate of iron and chlorate of potassa in glycerine and water as a vehicle, with salicylic acid, formed the treatment, while dry cold in the shape of an ice-bag was kept to the throat externally.

Every two hours the pharynx was thoroughly painted with compound tincture of benzoin.

"Recent observations have shown that benzoic acid has decided antiseptic properties. It manifests the same power to prevent fermentation and putrefaction, and to destroy minute organisms, as that possessed by salicylic and boracic acids."

See Roberts Bartholow, Materia Medica and Therapeutics.

The last two cases were treated with pilocarpine after Guttmann.

℞. Pilocarpini Muriatici, grain ¾.
Pepsini, grains 30.
Acidi Hydrochlorici, gr. iii.
Aquae, ʒ viii.

Dose, tablespoonful every hour.

OPTICO-CILIARY NEUROTOMY.

By O. F. Wadsworth, M.D.

The operation of optico-ciliary neurotomy is yet far from having attained a definite and fixed position in ocular surgery. It still has strong opponents and warm defenders; and while, perhaps, no one would now give it so extended an application as Schoeler at first claimed for it, whether it will retain a permanent place as an effective and valuable method in a more or less extensive class of cases, or whether it will eventually be generally abandoned, can be considered by no means positively settled. It is with the hope of contributing, in some degree, to the solution of this question, that I report fifteen cases in which I have performed the operation. It has been possible to follow all of these for some months, most of them for periods sufficiently long to give indication of the eventual results, — the longest period being more than three years.

Case I. — W. S., aged 40, boot-black. In 1865 a cataract was removed from the left eye, but after two years the sight failed, and the eye became useless. In 1868 cataract removed from right eye. The left was quiet till September, 1878, then became red, and tender in upper ciliary region, with photophobia. He was treated at the Eye and Ear Infirmary; the unpleasant symptoms passed off, and near the end of October he resumed work. But after working a week photophobia, and redness of left eye returned, and three or four days later — November 7th, 1878 — he came to me. Left: there was moderate circumcorneal congestion; tenderness in upper ciliary region; clear cornea; coloboma upward; capsule stretching from the cicatrix above downward to behind iris, leaving a clear opening more than 1‴ in

diameter; no reflex from fundus; no perception of light. Right: large coloboma upward; some capsule at lower and inner sides of pupil; moderate photophobia. Atropine and rest. Two days later he saw sparks before the right eye on exposure to light.

November 11th. Neurotomy. Two sutures were placed in the internal rectus, its tendon was divided, and Tenon's capsule widely opened; dissection with scissors back to opticus, which was divided close to the globe. A little farther dissection about the opticus allowed its stump to be rolled forward into a central position in front, and all attachments in a wide region around it were severed, including the insertion of the inferior oblique, and some of the venæ vorticosæ. The eye was replaced, the internal rectus tendon sutured, and a compressive bandage applied.

There was considerable exophthalmos immediately after the operation, which was slightly greater at the end of twenty-four hours, and then gradually decreased. The bandage was continued for ten days, and then iced compresses were applied during four or five days. Chemosis of conjunctiva was marked for some time, and it was two weeks and a half before it had disappeared. A week after the operation there was a small amount of blood at the bottom of the anterior chamber, and on the thirteenth day, after the head had been held in an inclined position, a clot, $\frac{3}{4}'''$ high. This was nearly absorbed two days later. Morph. sulph., one-eighth gr., was given the night after the operation, more on account of headache from the ether than from pain about the eye, and for two nights afterward chloral, xv. grs.

The cornea was completely anæsthetic. The man returned to his usual occupation in three weeks. There was still a little congestion at the inner side of the cornea at the end of two months. A divergence of about $1'''$ persisted. Movement inward was not quite as extensive as of the other eye, in other directions normal.

The tension soon became decidedly diminished, and in the course of a year the iris atrophied somewhat and the eye became a little smaller. For three or four months the cornea

retained its transparency, then its lower part became gradually opaque in the anterior layers, and a whitish membrane began to form across the pupil.

July 19th, 1881. A membrane closes pupil and coloboma; the anterior layers of the lower two-thirds of the cornea are opaque. The cornea is still wholly anæsthetic.

December 27th, 1881. Condition as in July. There has never been any discomfort in the eye, and it has not changed in size during the last two years.

Case II. — M. J. T., aged 52, laborer; received a wound of the left eye, from a piece of stone, in December, 1877, for which he was under treatment three weeks, the eye then becoming quiet.

January 15th, 1879, he entered the City Hospital, stating that the injured eye had been increasing in size for six months, and had been painful for two months, while, of late, sight in the right eye was beginning to be impaired. The left cornea was wholly opaque and markedly staphylomatous.

January 17th. Neurotomy; the operation as in the previous case, except that there was only one suture placed in the internal rectus. Exophthalmos immediately after the operation not very great. Bandage. During the following night the man started up from his bed and moved about the ward shouting "Murder." The next day exophthalmos was greater, the lower lid was rolled inward, and the globe exposed over a space some two-thirds the height of the cornea. The exposed parts of the conjunctiva were chemosed.

January 20th. Chemosis less; some superficial ulceration of cornea. Bandage omitted.

From this time the exophthalmos decreased; the ulceration was stationary for a few days and then healed; the staphyloma slowly became larger. Cornea anæsthetic.

February 1st. Paracentesis of cornea. The cornea collapsed, but in two days had again become prominent, and the paracentesis was repeated every two to four days till March 10th, when the man left the hospital.

May 17th, he entered the hospital again with Bright's disease. The eye had been free from pain; the cornea was still

anæsthetic, but quite prominent. During his six weeks' stay in the hospital Dr. Williams saw him, and twice slit the cornea across nearly its whole width. Both times the extensive wound healed without difficulty.

He was not seen again. I have learned that he died in the spring of 1880.

Case III. — W. G. M., aged 48, wood-turner. Entered the City Hospital January 24th, 1879. Two months before, his right eye was struck by a piece of fishing-rod, and he had since suffered from severe pain and photophobia.

Right: an irregular cicatrix at the inner side of the cornea, to which the iris was drawn over and attached; scarce any anterior chamber; bulbar conjunctiva thickened and congested; no V. Left: great photophobia; moderate conjunctival congestion; cornea and iris normal.

January 27th. Neurotomy. Moderate exophthalmos; both eyes bandaged.

On removing the bandage, the next day, the photophobia had disappeared. Iced compresses were substituted for the bandage after forty-eight hours.

February 12th. He went home to Vermont, with clear and anæsthetic cornea, still some congestion and swelling of conjunctiva at the inner side. Shortly after his return home there was a temporary inflammation of the right eye, which appears to have been a conjunctivitis. A few months later I saw him, and he said the eye had been free from pain, as it was then. Cornea still anæsthetic.

His employer informs me that M. died in March, 1881, of inflammation of the bowels. The eye had always been quiet.

Case IV. — M. McS., aged 21. Entered the Massachusetts General Hospital January 31st, 1879, for acute articular rheumatism. His left eye was then blind. On February 5th this eye inflamed, and on the 8th I saw him. There was iritis; complete occlusion of pupil; bulging of iris; severe pain; no perception of light. During the next fortnight his general symptoms were very much relieved, but the inflam-

mation and pain of the eye continued, and the iris bulged more, here and there touching the cornea.

February 18th. Neurotomy; back of globe cleared from all attachments over a wide circle about opticus. The insertion of inferior oblique divided in this, as in all cases; whether the superior oblique was detached, I am not sure, as I made no note of this at the time. The hemorrhage was not great, nor was there a very large amount of exophthalmos. Pain ceased immediately after the operation, and there was only the usual tenderness for two or three days over the wound.

March 18th. He left the hospital; the eye freely movable in all directions, standing slightly higher than the right, but with no apparent divergence; cornea clear and anæsthetic.

After leaving the hospital he worked on a farm, and for four weeks was free from pain. During the next month, however, he had four or five attacks of pain, always confined to the eye itself, usually coming on during sleep, and never lasting so long as twenty-four hours. He had also felt pain in the eye when jarred, as by the fall of a heavy cover, not from lifting.

May 15th. He came to the hospital during one of these attacks. There was general congestion of the bulbar conjunctiva, and a little deep congestion. The cornea was clear and anæsthetic, except close to the limbus. The discolored iris no longer bulged forward as before neurotomy, but stretched across the bottom of a fairly deep anterior chamber, its pupillary edge being the most prominent part. T. diminished. Considerable tenderness to pressure in upper and outer ciliary region. Atropine seemed to have no influence on the pain. Hot fomentations advised.

May 20th. He reports that the pain ceased during the night of the 15th, but returned on the 18th suddenly, and lasted some thirty hours. Now, considerable general congestion; tenderness to pressure as on 15th, but less; cornea still insensible. Complains of a dull ache in right eye. Enucleation. Capsule much more closely attached to globe than normally, especially at the inner side; the back of the globe attached to the parts behind it by firm, dense tissue

over a space some half inch in diameter. He left the hospital two days later, free from pain, and I have not heard from him since.

The eye was placed immediately in Müller's fluid, and examined later. The retina was completely detached, and stretched forward from the nerve entrance in the form of a small cord. The choroid everywhere in place. The posterior third of the eye was removed, and the choroid carefully lifted up. The ciliary nerves, in their course along the inner surface of the sclera, were much smaller and thinner than normal. Teased, and examined under the microscope, they appeared to consist simply of the sheaths of Schwann with their nuclei. No trace of myeline, and nothing that might pass for an axis cylinder could be discovered.

Case V. — W. S., aged 41, laborer. Entered City Hospital February 14th, 1879. Ten months before, he had been kicked in the right eye by a horse. Sight failed soon after. For the last three months right eye inflamed and painful, and the last month left eye sensitive also.

Right: moderate congestion; cataract; pupil fastened to lens, except upward and outward; no V. Neurotomy. Bandage three days; then cold compresses. He left the hospital March 5th, with some conjunctival congestion; cornea clear and anæsthetic; slight divergence.

January 26th, 1882. He has been seen from time to time, and has had no inconvenience, aside from occasional conjunctivitis of either eye, of small amount. The cornea perfectly transparent, anæsthetic everywhere; lens partly cretaceous, shaking a little with movements of eye; iris shrunken upward and outward, where not fastened to lens; eye soft, but no shrinking.

Case VI. — T. S., aged 45, laborer. Entered the Massachusetts General Hospital September 2d, 1879. Six years before, he had received a blow on the left eye, and since then had been able to work only about half of the time, the eye being free from pain for a few months, and again for some months so painful as to keep him idle. He had now been

unable to work for more than three months, and had lost flesh and strength from pain. The left eye congested, shrunken, with indentation from superior rectus ; cornea fairly clear, smaller than the other, containing some vessels ; edges of pupil nearly everywhere fastened to opaque lens ; tenderness to pressure on upper and outer ciliary region. He complained of weakness of the right eye also.

Both the patient and his wife refused enucleation positively, but assented to a proposed neurotomy.

The operation was from the inner side and presented no peculiarity, except that there was generally a much more intimate connection between Tenon's capsule and globe than normal. The bleeding was not excessive ; but the amount of exophthalmos, immediately after the operation, was more than usual. The following day the exophthalmos was greater ; the bandage was omitted, and iced compresses applied. For two days longer the general swelling of the orbital tissues was great and tense, and I feared phlegmon of the orbit. Comparatively little pain was complained of, however, and by September 8th, six days after operation, the inflammation had much subsided and the patient was very comfortable. He left the hospital September 18th.

He reported several times at intervals. In March, 1880, the eye was quite comfortable ; he said that only when he took cold did he have a little sting in it, "not enough to mind." There was then, and had been, some pain on *considerable* pressure in upper and outer ciliary region ; but this pain was not great, and seemed gradually lessening. The eye was smaller than before neurotomy ; the cornea contained a number of vessels in its tissue and was moderately sensitive.

October 16th, 1881. He has had no pain or uneasiness in the eye since March, 1880. The eye is much shrunken, quite hard, feeling as if it might contain bone ; the cornea about 3‴ in diameter, cloudy, moderately sensitive. No pain from firm pressure on any part of the eye.

Case VII. — G. De G., aged 22, painter. Entered City Hospital February 9th, 1880. Lost sight of left eye when

three years old. Three years ago this eye was red and painful for a time. One year ago it again became painful, and continued so for three months, the pain being enough to prevent sleep. The last three months it had been painful, mostly at night. Right: not affected. Left: a horizontal cicatrix at inner side of cornea, which is otherwise clear; pupil drawn far to inner side behind cicatrix, very small; iris a little changed in color; scarcely congestion; some tenderness; some divergence.

Neurotomy. Two sutures in internal rectus to correct divergence. He left the hospital February 18th. Cornea anæsthetic.

July 13th, 1881. Patient has been seen at long intervals. There has been no shrinking. Cornea still transparent. There is capability of distinguishing touch over the whole cornea, but no feeling of discomfort, even from considerable pressure with a probe, nor sign of shrinking, as there is when the right cornea is touched ever so lightly. No tenderness in ciliary region. T. lessened. Iris and pupil as before operation. Slight convergence. Never any pain.

December 9th. Condition unchanged. A very light touch on the cornea with the torn end of a bit of paper is not always perceived.

Case VIII. — L. H., a girl, aged 8, was struck in the right eye by the horn of a cow in July, 1879. In November she began to have pain in the left eye, and was confined to bed for a month. I saw her January 19th, 1880. There was decided photophobia. Right: moderate congestion; globe much shrunken; cornea 3‴ in diameter; a cicatrix in sclera upward and inward, concentric with corneal edge, nearly one-half inch long, in part dark and projecting; no tenderness to pressure. Left: little congestion; pupil quite small and irregular, and closed by gray membrane. She had recently made a journey of two or three days from the West, and was still tired; but, with tonics, rest, and atropine to the left eye, her general condition improved rapidly.

January 26th. Left: counted fingers at 3′.

February 1st. Right: tender to touch and a little congested.

Left: little congested; fingers 6′ to 7′. Neurotomy, right. Free opening of capsule, opticus cut close, tendons of both obliqui divided, and back of globe well bared. Hemorrhage not excessive, though face much congested from ether, and ceased as soon as the division of attachments allowed the back of the eye to be rolled forward. Bandage removed after forty-eight hours. No pain; no ecchymosis of lids; very little swelling. The catgut suture had not held, and there was marked eversion.

February 8th. Left: fingers at 10′.

A fortnight later she struck the outer angle of the left eye against a table, and, although she did not complain of pain, there was, on the 26th, more congestion of the left eye, and she counted fingers only at 5′ to 6′. The congestion passed away, but sight still decreased a little during the next six weeks.

April 10th. Iridectomy was attempted. The iris tore, and bled freely; the small opening made soon closed, and there was no improvement of vision.

June, 1881. The right eye has remained free from tenderness or pain. She can no longer count fingers with the left.

Case IX. — K. B., aged 23. Entered City Hospital August 30th, 1880. The sight of the right eye had been lost for a long time. For eight weeks she had had pain in and about it, for which she had been obliged to take morphia daily. Right: considerably shrunken; tender to pressure; cornea containing vessels. Left: cloudy opacities of cornea. Photophobia.

Neurotomy. Four or five days later she had an attack of diarrhœa, which weakened her much. September 27th she left the hospital, the globe small and soft; tenderness much less; the vascular cornea sensitive.

March 16th, 1881. The globe has shrunken more; the cornea is two-thirds the diameter of the other, vascular, sensitive. She complains of pain and tenderness, but bears considerable pressure without noticing it when her attention is distracted. Declines enucleation.

July 11th, 1881. Still complains of pain and tenderness, but the pain is dull, in the brows, not more on one side than the other. She has been obliged to sew for her livelihood, and has quite imperfect sight in the left eye, is anæmic and weak, and it seems probable that a large part of the pain complained of is caused by overwork of this poor eye. She is unwilling to have the right eye touched, and it is, therefore, impossible to determine if there be really tenderness. Refuses enucleation.

December 5th. The eye is quite free from congestion; not smaller than in March; soft; not tender to pressure in the ciliary region; cornea less vascular, but sensitive. The patient now states that she has had no pain in the right eye since four or five months after the neurotomy, but that she has some dull aching above the left eye after using it for a time.

Case X. — J. D., aged 11, school-boy. When four years old his right eye was struck by a piece of slate and its sight lost. Early in the fall of 1880 this eye began to feel heavy and painful whenever he read much, and he was obliged to leave school. Then the eye ceased to trouble him for a time, but in January, 1881, he again had pain from reading in this and in the left eye also.

January 24th, 1881. Admitted to the City Hospital. Right eye smaller; its cornea three-fourths the diameter of the left. A cicatrix, to which the iris is fastened, runs diagonally across the cornea and extends a little into the sclera. A little sensitiveness to pressure. The cornea contains a few vessels. Neurotomy.

February 2d. Discharged; well. No note was made in the record of the state of the eye on that date, but the cornea was not anæsthetic.

September 30th, 1881. Has been employed as an errand-boy since leaving the hospital. The eye has been free from pain, and he has been able to read without trouble. Globe nearly free from congestion, although there is a moderate trachomatous affection of both lower lids. Cornea generally clear, but containing a few fine vessels, its sensibility greatly

diminished, not wholly anæsthetic. No tenderness to pressure. No farther shrinking. Tension diminished.

January 15th, 1882. The eye is a little smaller than in September; in other respects unchanged.

Case XI. — R. McG., aged 11, school-boy. Admitted to City Hospital February 2d, 1881. In August, 1880, right eye struck by a stone. Under treatment at the Eye and Ear Infirmary six weeks. Since then unable to attend school because reading causes pain in the eyes. Right cornea somewhat irregular in outline, contains many fine vessels. A horizontal cicatrix extends more than half across the cornea, and 2‴ into the sclera at the inner side. The thinned and discolored iris is fastened to the cicatrix, and above is separated for a short distance from its ciliary attachment. Little tenderness. Sees movement of hand against the light. Neurotomy.

February 24th. Discharged. Corneal sensibility lessened, but not lost. He returned to school from the hospital, and had no farther difficulty in studying.

July 18th, 1881. He came to the out-patient department with a catarrhal conjunctivitis of the left eye, which passed off under treatment. The cornea contained fine vessels, except in a small space half-way between the scar and the lower edge. This free space was anæsthetic. Elsewhere there was sensitiveness, but decidedly less than that of the left cornea. T. diminished. No tenderness.

January 25th, 1882. The eye is smaller than in July; the cornea especially has shrunken, and is more vascular. There is no tenderness, and the boy has experienced no inconvenience.

Case XII. — J. McI., aged 11, school-boy. In December, 1880, he received a blow on the right eye from a stick. The eye was painful for some two weeks, then became quiet. Early in February, 1881, however, he began to have pain in it again on attempting to read or study.

An irregular cicatrix ran from the inner edge of the cornea nearly to its outer edge. To this the discolored and

stretched iris was fastened. Moderate congestion; no special tenderness; bare perception of light. He was treated as an out-patient at the City Hospital, for a few days, without relief.

February 17th. He stated he had pain the night before in the left eye also. He was admitted to the hospital and neurotomy performed. No pain after operation.

March 2d. Discharged. The cornea clear, except at the cicatrix, anæsthetic.

August 13th, 1881. The boy was at school after leaving the hospital till vacation, at the end of June, and had no trouble. Now divergence $1\frac{1}{2}'''$; no congestion; cornea (except cicatrix) clear, anæsthetic except close to limbus; iris looks better; T. lessened. No tenderness.

December 27th, 1881. Condition as in August.

Case XIII. — T. C., a boy, aged $6\frac{3}{4}$, was seen in consultation December 12th, 1880. Two weeks before, he had cut his right eye while whittling. He complained little at the time, but after two or three days had photophobia, pain in brow, etc. For five days he had had atropine and bandage. There was moderate congestion; cicatrix of cornea from its outer edge to near the centre; iris attached to cicatrix and bulging forward at its inner and upper part; pupil $1\frac{1}{2}'''$, irregular, with grayish reflex. So much photophobia as to prevent accurate examination of the left eye, which, however, except for slight congestion, appeared normal. The father was strongly warned of the danger of sympathetic ophthalmia, but it was only on March 8th, 1881, that I saw him again. Meanwhile he had had much photophobia and been kept in a darkened room.

March 10th. Moderate congestion; cornea clear, except for linear cicatrix; iris attached to cicatrix, and everywhere bulging forward nearly to the cornea; globe soft. Neurotomy. Division of internal rectus, of inferior and most of insertion of superior oblique; opticus cut short; back of globe cleaned well towards equator. Moderate bleeding; no exophthalmos; two sutures. The day after the operation photophobia had disappeared, and he made no complaint

afterwards. His mother was so anxious about him, however, that he was allowed to go out little for more than a month, and then only with shade or bandage over the eye, although he did not wish it. Even in May he had been watched over so closely that he was much afraid of having anything done, and I could not test the sensitiveness of the cornea. There was still a button of granulations at the site of the conjunctival wound, which kept up some congestion at that part.

October 1st, 1881. The boy's mother states that the granulations at the inner side of the cornea disappeared early in June. He never complains of the eye, and has no trouble at school. The eye is generally pale, but reddens when he gets much heated playing out of doors, the redness passing off readily. Scar in cornea less marked; cornea transparent generally, one or two vessels running into it from lower edge; a little below the cicatrix a faint grayish line, slightly uneven and elevated, runs partly across the cornea, — a scratch of the epithelium. There is little, if any, sensibility of the cornea; the iris no longer bulging, but the anterior chamber shallow. Globe soft, of the same size as when operated on.

Case XIV. — J. S., aged 32, stone-cutter, was struck on the left eye by a rope, in the summer of 1880. The eye was very painful for some two weeks; afterwards he noticed no defect till about the first of May, 1881, when the sight of this eye began to fail, accompanied by dull pains in the left brow and temple. July 1st I saw him at the City Hospital. He had been using atropine for a time without relief. The left eye was moderately congested; cornea clear; iris turbid, and much discolored; pupil free and of fair size; lens cataractous. There was no marked tenderness. He counted fingers at 2′. He complained that for six weeks he had been able to use his right eye for a short time only, and it was becoming weaker. Vision was normal in the right eye, but its accommodation decidedly below the normal.

July 8th. Neurotomy. Both obliqui divided and posterior half of globe cleared. Hemorrhage and exophthalmos moderate. He left the hospital July 11th, and returned to his

work on the 19th, but was unable to continue at it because of his inability to judge well differences of level.

July 25th, when last seen, the cornea was anæsthetic, the eye freely movable, no pain or discomfort. Atropine did not affect the pupil.

January 4th, 1882. From a letter of this date I learn that the eye has continued in a satisfactory condition.

Case XV. — D. H., aged 40. In April, 1880, a piece of iron entered his left eye; pain and photophobia four months, then the eye became quiet. Early in 1881 pain returned, and, June 6th, he presented himself to Dr. Williams, at the City Hospital. A point of metal was visible near the lower edge of the cornea; an incision was made, and a splinter of iron, ten mm. long, removed. He left the hospital June 13th, but returned a month later, and came under my care. During this interval there had been dull pain in left eye and brow, and for the last week, after using the right eye for an hour or two, there would come a "dull, heavy ache" in this eye also, with dimness of vision.

The left globe was somewhat shrunken, moderately congested; its cornea about two-thirds the normal diameter, partially transparent, with many vessels beneath the surface. Tenderness to pressure.

July 13th. Neurotomy. Both obliqui divided, and nearly the posterior half of the eye cleared. Very little exophthalmos. Three days later he left the hospital, the vascular cornea everywhere sensitive, though less so than the cornea of the other eye. No special tenderness.

October 16th. Patient states that during August he worked in the hay-fields in the sun, and for four weeks had a "kind of ache" about the left eye. Since then the eye has been quiet, except that once in a week or ten days there is a "heavy feel" over left brow for a few minutes. The cornea is a little smaller than at the time of operation, vascular, sensitive. The globe rather smaller, hard. Pressure on the ciliary region, near the cicatrix, is painful when firm; elsewhere bears even firm pressure without pain.

January 4th, 1882. Free from discomfort for some time.

Still sensitiveness to pressure near the cicatrix, somewhat less than in October. Globe soft.

In the first case the bandage was continued much longer than in any of the others, and, I believe, tended to keep up the chemosis; in the last few cases iced compresses were substituted for the bandage so soon as danger of vomiting from the ether was over. There was in no case any large amount of hemorrhage; in the first few cases the precaution was taken to close the lids and make gentle pressure for a few minutes after division of the opticus, but this has not appeared necessary in the later cases. Indeed, it has seemed that the most effective means of checking the bleeding was the thorough division of all attachments of the globe at the posterior pole of the eye; at least, I have found bleeding to rapidly cease so soon as these attachments were divided freely enough to permit the easy rolling the stump of the opticus to the front. And it is not perhaps unreasonable to explain this on the supposition that until such division is complete the vessels are unable to retract sufficiently to enable proper closure of their cut ends.

In the case of an aged person, with atheromatous arteries, the liability to troublesome hemorrhage during the operation would undoubtedly be greater. I have not yet had occasion to operate in such a case. But, even under these conditions, the experience derived from enucleation would show that the risk of hemorrhage is not enough in itself to be a counter-indication to the performance of neurotomy.

In all cases the operation has been done from the inner side, the internal rectus divided, the stump of the opticus brought fairly into the centre of the palpebral opening, and the sclera denuded for a wide space about it; in all, the inferior oblique has been separated from its insertion; in some, the superior oblique also. Rectus reunited by suture. Usually slight divergence has resulted from the operation. In one case where, before operation, there was a little divergence which the patient desired to have corrected, a convergence of small amount was left. The earlier cases were retained in hospital generally longer than was necessary, in

order the better to observe their progress; the last two cases left the hospital at the end of three days.

Two cases only presented any large amount of exophthalmos; the second, in which there was a prominent staphyloma, and the patient's excitement during the night after the operation probably increased the protrusion of the eye; and the sixth. In the latter case, the exophthalmos was not so great as to prevent covering the globe by the lids; there was no special ecchymosis to suggest excessive hemorrhage behind the eye; and the greater reaction of the orbital tissues to the operation may well have been due to the extensive adhesions which existed between capsule and sclera from previous inflammation. The ulceration of the cornea in the second case (it occurred in no other) I now think might have been avoided if the bandage had been omitted so soon as it was found the lids did not cover the globe. This case also presents a striking illustration of the vitality of the eye remaining after so extensive a division of nerves and blood-vessels. Though the cicatricial tissue which had replaced the cornea was wholly anæsthetic after the neurotomy, yet not only the wounds of the paracentesis needle, but slits across nearly the whole diameter of the cornea, readily united.

In Case IV. pain returned in the eye two months after the operation, with tenderness in a part of the ciliary region, but without sensibility of the cornea. It is possible that here the pain and tenderness may have been due to a rheumatic affection of the episcleral tissues, — the patient had come to the hospital with articular rheumatism, — it may have been, however, that a ciliary nerve entering the eye far forward had escaped division. Yet it might well be expected that a nerve penetrating the anterior part of the sclera would be distributed in part to the cornea, and the cornea remained anæsthetic. On this point the evidence is insufficient to admit a positive decision. The result of examination of the nerves entering the posterior part of the eye may fairly be regarded as evidence that there had been no reunion.

In three cases, VI., IX., and XV., tenderness to pressure persisted for a long time after operation, but in neither was

it great; it was present too soon after the operation to be attributed to reunion of nerves; it diminished rather than increased with time; it eventually passed away altogether in the first two cases, and in the third became less in the course of the six months the patient was under observation. In each of these cases there was moderate sensibility of the cornea, but in each also was the cornea vascular. In Case IX., there was some complaint of pain; but on inquiry this was found to be in the brows, as much on one side as the other, rather a dull ache than a pain; and it seemed due to overwork of an eye with quite imperfect vision. Confirmation of this view is afforded by the fact that later the ache was stated to be felt only after use of the left eye and only in the left brow. In Case XV. there was for a few weeks some ache about the eye during work in the hot sun.

In seven cases the cornea was transparent and free from vessels before neurotomy. In one of these (IV.) enucleation at the end of three months for pain and tenderness in the ciliary region, the cornea still anæsthetic. In three (I., V., and XII.), no return of sensibility in the cornea so long as they were under observation, — thirty-seven, thirty-five, and ten months. Another case (VII.) was under observation twenty-two months; here a light touch on the cornea could usually, not always, be felt, but strong pressure caused no pain or discomfort, and it is possible that the touch was felt only by transmission of the impulse. In one case (XIII.), a boy of seven years of age, there was apparently no sensibility of the cornea at the end of seven months. One (XIV.) was under observation only seventeen days. Transparency was preserved in all but one of the cases.

When the cornea was vascular, however, it always recovered its sensitiveness in part, though it became in no case so sensitive as that of the other eye. In some instances sensitiveness was probably never wholly lost at any time; certainly it was distinctly present in one case (XV.), in which both obliqui were divided and the posterior parts of the globe cleared as far as the equator, three days after neurotomy, and in the others within two or three weeks. In Case VI., again, it was wholly lost for some days, at least, during the

height of the swelling of the orbital tissues. In some cases observation on this point was not so careful as to allow a positive statement whether a moderate amount of sensibility existed soon after the operation or not.

This sensitiveness of the vascular cornea may be referred to development of nerves from the conjunctiva accompanying the vessels. That it was not due to reunion is evidenced by its early existence; and that it was not from ciliary nerves which had escaped section is shown by the fact that it was coextensive with the vascularity. In Case XI., for instance, six months after neurotomy, the small portion of the cornea free from vessels was still anæsthetic; while in Case XV., the whole extent of the cornea being vascular, sensitiveness existed everywhere three days after operation.

The results that I have obtained in the cases above reported give encouragement to farther trial of the operation, and those of some others have been also favorable. Schoeler, who first brought the operation to general notice, is, as might perhaps be expected, warmly in its favor after having performed it many times; and Schweigger, also with extended experience, says, in the last edition of his handbook, that, if resection of the opticus be made as he describes, the domain of enucleation may be restricted to intra-ocular tumors, and, in certain cases *(eventuell)*, to eyes in which foreign bodies maintain a chronic inflammation, while it should be wholly rejected for cases in which pain in blind eyes is the reason for operation. Schweigger at first expressed satisfaction with simple division of the nerves. It would be of interest to know whether he now practises resection because of some lack of permanent result from division alone among his own cases, or from theoretical grounds and because of reported cases of recurrence of pain and sensibility. Resection must, of course, diminish the chances of reunion of nerves, but must at the same time make the operation to some extent a more serious one, and increase the risk of hemorrhage.

But there is another side to the picture: recurrence of pain and tenderness to pressure, and return of sensitiveness in the cornea, have been not infrequently observed; and the operation has been sometimes attended, or shortly followed, by

hemorrhage sufficient to necessitate enucleation, or cause destruction of an eye pushed forward so as to be unprotected by the lids. While some of these results may be without doubt attributed to an imperfect or faulty method of operation, this explanation will by no means apply to all the unsuccessful cases reported.

Aside from hemorrhage, two dangers have been chiefly insisted on: that some of the ciliary nerves might escape section; and that subsequent reunion of nerves might take place.

As regards the first of these, it is to be noted that Cruveilhier briefly states that two or three ciliary nerves enter the anterior part of the sclerotic beneath the recti muscles; and, again, Friedrich Arnold, writing in 1831, describes the ciliary nerves as leaving the ciliary ganglion usually in two bundles, an upper and a lower: "One of the branches of the lower bundle, which I found constantly present, differs importantly in its course from the rest; for immediately after its origin from the ciliary ganglion it leaves the other branches, inclines toward the outer side, and, after a long course through the fat of the orbit, reaches the forward part of the bulb, and perforates the sclera at that point." But he does not figure this branch in his plate. Cruveilhier's statement has been many times quoted in connection with ciliary neurotomy.

Later writers on the anatomy of the ciliary nerves in man, however, so far as I am aware, with a single exception, describe these nerves as all entering the sclera around the optic nerve, and not very far distant from it. Redard[1] alone states that his dissections have shown that "one, two, or three filaments belonging to the long ciliary branches perforate the sclerotic near the muscles of the eye. One of these filaments, which is encountered almost constantly, perforates the sclerotic at the level of attachment of the superior oblique muscle. Sometimes a ciliary filament is found perforating the sclerotic immediately beneath the superior rectus muscle."

If branches of the ciliary nerves do enter the sclera far forward, they must often escape division. Branches pene-

[1] De la section des nerfs ciliaires et du nerf optique, Paris, 1879.

trating at the level of the insertion of the superior oblique muscle would, indeed, be severed by a dissection of the surface of the globe reaching everywhere as far forward as the equator; but even in so thorough a dissection as this, nerves perforating beneath the recti muscles would probably escape. In such case it would seem that a portion of the cornea should preserve its sensibility immediately after operation, or, if the uncut nerves have yet been numbed by stretching, sensibility should return within a comparatively short time.

The weight of anatomical evidence, as already stated, is strongly against the existence of branches of ciliary nerves which enter the sclera well forward, and the clinical evidence tends in the same direction. Whenever the posterior portion of the globe has been extensively freed from its attachments, the whole cornea (provided it was not vascular) appears to have been rendered non-sensitive.

As for the reunion of the ciliary nerves, it may be urged that, from their very small size, and from the fact that they lie in loose tissues without any firm sheath to direct their course if regeneration be attempted, it is highly improbable that this should take place. Theoretical considerations, however, are not to be relied on to settle the question. Clinical evidence must have more force, though anatomical evidence only can be sufficient to positively decide it.

It has been generally assumed that the slow return of sensibility to the cornea, with or without pain and tenderness on pressure of the globe, gives assurance that the ciliary nerves have reunited and regenerated. Many cases have been reported in which sensibility did return, and a lesser but not inconsiderable number in which there was pain also. In many of these, too, the operation seems to have been done with all thoroughness and care. It is not easy to explain this result, except on the supposition of nerve reunion. The difficulties of the question are not diminished by the reflection that some operators have followed up cases for long periods of time and observed no return of sensibility, while others have seen the cornea again become sensitive in all or nearly all of their cases which they could subsequently ex-

amine. Unfortunately, but few have given the results of continued watching of their cases.

Bunge,[1] writing of fifteen neurotomies in Graefe's clinic, states that five escaped prolonged observation; one required enucleation on account of hemorrhage (hemorrhagic glaucoma); one, on the second day, for suppuration of the globe; in one case the cornea was still anæsthetic at the end of seventeen months; the remaining seven had recurrence of pain or of sensibility of cornea. Be it said that in one of these last, pains, in one pain and corneal sensibility, returned within six weeks,—a period too short to admit belief in reunion.

Hirschberg[2] operated in nine cases, always thoroughly denuding the posterior half of the globe after bringing the stump of the opticus into the middle of the palpebral aperture and dividing both obliqui, but "after one year's observation of the cases which I had opportunity of watching, I could always prove that the sensibility of the operated globe, particularly of the cornea, had returned, whenever sensibility had been present before the operation." The last clause probably refers to sensibility to pressure; he can hardly have operated on an eye with anæsthetic cornea. He does not say how many the watched cases were.

Deutschmann[3] reports on nine cases: the eye was rolled completely forward. One patient did not appear again; one left after eight days, with not wholly insensitive cornea. In the other seven sensitiveness of the cornea returned, and in two of these tenderness to pressure also.

A case published by Leber,[4] of sympathetic ophthalmia after neurotomy, is of importance. A boy of eight years received a wound from an awl through the lower edge of the cornea into the vitreous. Loss of sight, opacity of the vitreous, and injection of the eye, followed; three months later, neurotomy. The boy went to his home with a slightly phthisical eye, nearly free from congestion, and anæsthetic cornea.

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[1] Klinische Beobachtungen über die sympathische Ophthalmie, Dessau, 1880.
[2] Archives of Ophthalmology, IX., p. 396.
[3] Archiv für Ophthalmologie, xxvii., 1.
[4] Archiv für Ophthalmologie, xxvii., 1.

Two years and a half afterwards he returned. The wounded eye was much shrunken, hard, somewhat tender to pressure about the scar, its sensibility completely restored. In the other eye dimness of vision had been noticed for six weeks, and it presented an iritis precisely of the appearance of that excited by sympathy.

The anatomical evidence of reunion is not extensive. Poncet,[1] at the International Congress at Milan, in 1880, stated that in the dog he had demonstrated all the stages of regeneration in the ciliary nerves after neurotomy, but added: "This regeneration has, however, only been shown in the extra-ocular parts [central ends?] of the ciliary nerves; it is still to be sought in the ciliary plexus, and in their sub-choroidal course."

Two of Bunge's cases, already referred to, were examined microscopically by Kuhnt. In one of them there was complete sensibility of the cornea seven months after neurotomy; in the other, neurotomy was performed three times, and, finally, enucleation for pain "in the orbit" and "behind the eye," the cornea being without sensation, but the ciliary body somewhat tender to pressure. In the former of these eyes Kuhnt found one ciliary nerve in a condition indicating active regeneration; in the latter were two nerves presenting similar appearances. All the other ciliary nerves were completely degenerated. Kuhnt preferred to believe that in these cases the regenerating nerves had never been divided, but only injured by stretching and contusion, — a conclusion which Bunge was not disposed to share.

Finally, Hirschberg[2] reports a case of enucleation for pain and sensitiveness, after two neurotomies, from the outer and the inner side, with an interval of a month, had been performed by an experienced oculist, the eye containing a long piece of iron. He states briefly: "The uveal tract and retina were detached from the thickened and folded sclera, and the space was filled with firm connective tissue. The ciliary nerves were carefully dissected out on the inner surface of the sclera, and found histologically normal." The full force of

[1] Compte rendu da Congrès, etc. Annales d'Oculistique, T. 84, p. 189.
[2] Loc. cit., p. 394.

this statement can scarcely be intended, for then it would appear that, in the space of eleven months, which had elapsed since the second neurotomy, all the ciliary nerves had reunited and undergone entire regeneration. Such a result would seem almost incredible, particularly when the condition of the globe is considered.

Admitting the occasional reunion of ciliary nerves, is it necessary to assume this in every instance in which sensibility of the cornea returns? When the cornea is vascular it need not be necessary. But if the cornea be free from vessels? Writers on the nerves of the cornea agree in the assertion that these nerves are derived partly from the conjunctival nerves. Would it be venturing too much to suppose that in some cases after division of the ciliary nerves an increased development of the branches derived from the conjunctiva occurs? On the other hand, it is difficult to understand how, if the corneal nerves are derived partly from the conjunctiva, the whole cornea should remain anæsthetic for a long time, or even permanently, when only a limited portion of the connection between conjunctiva and cornea has been severed by the operation.

Leber's case of sympathetic ophthalmia after neurotomy is regarded necessarily as furnishing a strong argument against the operation. It is true this is but a single case, and there have been hundreds of neurotomies, and it is, of course, *possible* that the inflammation in this case may not have been aroused by sympathy. It is also true that within a few years a number of cases have been reported, in which the first symptoms of sympathetic inflammation showed themselves days or weeks after an uncomplicated enucleation. But it is to be remembered that not very unfrequently eyes have been enucleated subsequently to neurotomy, on account of symptoms which were believed to point to a condition threatening danger to their fellow-eyes.

Despite all the arguments that have been brought forward against optico-ciliary neurotomy, it seems to me to offer sufficient advantages to make it not only justifiable, but advisable, in many cases. It is yet too early in the history of the operation to define with precision in just what cases neurotomy

may be substituted for enucleation with prospect of gain for the patient, and the indications of the individual case must always influence the decision. At present I am disposed to limit its employment within somewhat narrower bounds than those proposed by Schweigger, as above quoted.

NOTES OF TWO CASES OF UTERINE FIBROID.

By O. W. Doe, M.D.

The following two cases of fibroid tumor of the uterus are reported as illustrating in one the ease, and in the other the difficulty, of forming a correct diagnosis.

Case I. Mary C., 45 years of age, entered the City Hospital on May 4th, 1878, and gave the following history. She had had six children, the youngest seven years old; at one time twins; had never miscarried. Catamenia appeared at the age of fifteen and continued regular until three years ago, at which time she was seized with a sudden and profuse uterine hemorrhage, the flowing continuing for a week. She had supposed herself pregnant, nothwithstanding the regular appearance of the catamenia, as the abdomen had gradually increased in size. Since then she had noticed "a lump in the right side of the abdomen, low down," and had had a return of the flowing as often as every seven or eight weeks. The present attack began five days ago and has since continued, being attended with severe pain in the hypogastric region.

Has had occasional retention of urine for the past two weeks. Present condition of the patient is that of exhaustion from loss of blood, although the flowing has now nearly ceased. Pulse, eighty-eight. Temperature, 98.4°. She was ordered twenty drops of tinc. ferri chlor. three times daily.

May 6th. But very little hemorrhage since entrance. External examination shows the existence of a hard, pear-shaped tumor in the hypogastric region, extending longitudinally from the pubes to the umbilicus, and transversely to within two inches of each anterior superior spinous process of the ilium. Vaginal examination shows the os high up, directed posteriorly, and normal in appearance. The sound

passes six inches and somewhat to the left. Four laminaria tents introduced.

May 7th. Tents removed. Has had very little pain. The cervix admits but one finger. Examination shows the tumor to be without doubt a fibroid occupying the entire right wall of the uterus, extending more anteriorly than posteriorly, and probably submucous in variety. Ordered one drachm fluid ext. ergot every four hours.

May 10th. Has suffered severe pain in the hypogastric region for the past twenty-four hours. Some tenderness over fundus uteri. Vomited once this morning. Ergot to be discontinued.

May 13th. No pain for two days. Pulse and temperature normal. Four large laminaria tents introduced.

May 14th. Tents removed under ether. Inner os dilated so as to admit two fingers. A more thorough examination of the tumor shows it to involve the right side of the uterus, as previously mentioned, extending from near the fundus to the inner os, but not encroaching upon it. The tumor projects into the uterine cavity so as to form a mass the size of a large orange. An incision was made so as to partially divide the inner os anteriorly, posteriorly, and laterally on the right side, and was also extended longitudinally so as to divide the mucous membrane covering the tumor. Fluid extract ergot ordered, to be given in drachm doses every three hours.

May 15th. Pulse, seventy-two; temperature, normal. Uterus firmly contracted and very sensitive to the slightest pressure over the fundus. Pain during the night was relieved by one-fourth grain of sulphate of morphia, but was quite severe this morning.

May 16th. Pulse, seventy-six. Uterus still remains very sensitive to pressure. Slight bloody discharge, of an offensive odor. Vaginal douche of carbolic acid, one drachm to a pint of water, was ordered three times daily.

May 20th. Pulse, one hundred and twelve; temperature, one hundred. Tongue moist. Uterus remains very firmly contracted. No chill since entrance. Sulphate of cinchonidia, three grains, three times daily.

May 23d. Pain not at any time severe. General condition remains satisfactory. Offensive discharge continues free and of a dark color.

May 27th. Over the right side of abdomen, below line of umbilicus, is a marked prominence, which, on palpation, has a tense, full feeling, with an indistinct sense of fluctuation.

Aspiratory needle introduced, but no fluid obtained. Vaginal discharge continues offensive, though less in amount, the past two days. Patient states that she has passed per vaginam, "two small pieces of rotten meat."

May 28th. Pulse, one hundred and sixteen, small; temperature, one hundred and two. Discharge increased in amount, sanguino-purulent in character, and very offensive. No pain. Countenance pale and of a slightly ashy hue. Ten laminaria tents introduced at 5 P.M. Ten grains of sulphate of quinine given at 7 P.M. Carbolic acid douche every three hours.

May 29th. 5 A.M. Has had very little pain during the night. Pulse, one hundred and twenty, small. No vaginal discharge. Tents removed, leaving the cervix and inner os dilated sufficiently to admit three fingers. The tumor, in a sloughy condition, protruded into the cervix. With a pair of double-hooked forceps the mass was seized high up, and by firm traction was easily enucleated entire. During the process an abcess in the broken-down growth was ruptured, and discharged about an ounce of clear pus. The tumor weighed sixteen ounces, and was disorganized throughout. After its removal a finger introduced into the uterine cavity showed the wall of the right side, both anteriorly and laterally, to be very thin, and smooth to the touch; the uterus being very flaccid. Inspection showed a marked depression anteriorly to the right and below the umbilicus. No hemorrhage took place during the operation, which was done under ether. Intra-uterine injections of carbolic acid solution ordered to be given every three hours. Five grains of sulphate of quinine every four hours. 11.30 A.M., pulse, one hundred and twenty; temperature, ninety-nine. No pain.

May 30th. Pulse, one hundred; temperature, normal. Vaginal discharge very slight and not at all offensive. No

pain. No abdominal distention or tenderness on pressure. Patient's condition satisfactory.

May 31st. Slight serous discharge from vagina, but without odor. Quinine reduced to two grains three times a day. From this date the patient gradually improved and was discharged well on June 26th. The uterus measured at this time only three inches.

Case II. — Mrs. D., 43 years of age, married, entered the hospital June 21st, 1880, on account of uterine hemorrhage which had continued excessive for nearly three weeks. She was of medium height, but of small physique, and quite emaciated, as from long suffering. At the time of entrance she was extremely anæmic, and very much exhausted. The following history was obtained: Her general health had always been good until the commencement of her present illness. The catamenia began at the age of eighteen, were regular and unattended by pain, the flow usually continuing a week. Leucorrhœa had been quite troublesome for three years past. Had never borne children or had any miscarriages. Five months ago, without any symptoms calling her attention to it, she noticed a small swelling above the pubes, just to the right of the median line, which has gradually increased in size and extended on to the left side. It was painless at first, but soon after became quite sensitive to the touch. Three months ago she was seized with a very severe pain in the right hypogastric region, extending down the thigh, and especially acute on standing. Catamenia last appeared about May 1st, and the flow has not wholly ceased at any time since, often passing away in clots. For three weeks past she has suffered greatly at times from sharp, cutting pains, beginning in the region of the tumor and extending down the thighs. Micturition has been frequent and painful, the catheter being often required.

June 22. Pulse, one hundred and thirteen. Temperature, 99.5°. Tongue clean. Bowels regular. Complains of anorexia, and pain in the right lumbar region. Has had but little hemorrhage for the past twenty-four hours. Inspection shows a marked swelling of the abdomen, extending

from the pubes to within a half an inch of the umbilicus, more prominent on the right side than on the left. The appearance of the abdomen is that of pregnancy at the fifth month, yet at no time has there been any motion simulating fœtal movements, or any nausea or vomiting. The breasts are perfectly normal in appearance. On palpation the tumor is tense and elastic, especially on the right side; the tense feeling extends three inches to the left of the median line. On the right side the growth feels like a cystic tumor; on the left, like a fibroid. At the margin of the tumor on the right side, three inches above the pubes, is felt a hard nodule, the size of a small English walnut, which is exceedingly sensitive on pressure, and the seat of sharp pains. Over the whole tumor is a distinct souffle, but to the left of the median line, an inch above Poupart's ligament, it has a loud, blowing character and gives a distinct thrill on palpation. Vaginal examination shows the cervix low in the vagina, without any apparent shortening. No indurated mass is detected by the examining finger, but the vaginal wall to the right of the cervix and anteriorly imparts a feeling of elasticity. The sound passes three and one-half inches, directed anteriorly and to the left, and its withdrawal it followed by a free discharge of arterial blood. The aspirator needle was inserted through the abdominal wall, two inches to the right of the median line, at a point where the feeling of elasticity was especially noticed, and an ounce and a half of bright blood withdrawn. The sensation produced by the introduction of the needle was as if it passed through a semi-solid mass.

July 1st. Pulse, one hundred. Temperature, one hundred. Considerable pain in the hypogastrium, extending down the thighs, with increased tenderness over the tumor, followed the aspiration and continued two days. Countenance has become more pinched, with the aspect of one suffering from carcinoma. Has had no chills or vomiting. The tumor has diminished in size from above, downwards, about one half an inch; also from side to side, so that it now measures eight inches on a line between the crista ilii, and seven inches vertically from the symphisis pubis. Flowing

has been quite profuse since the last record, but now slight in amount. It comes on often in gushes of a dark color, and has been but little influenced by the use of ergot in drachm doses three times daily; yesterday the pain was very severe throughout the hypogastric region, especially marked on the right side.

July 17th. Pulse, eighty-four. Pain has become more severe during the past three days over the right side of the tumor, and has been especially sharp at the seat of nodule previously mentioned. The tumor has become more prominent on the right side, extremely sensitive to touch, and gives an indistinct sense of fluctuation. Aspirating needle inserted at the seat of fluctuation passes through a semi-solid mass to the depth of two and one-half inches, but no fluid obtained. From this time until her death, July 29th, hemorrhage continued at intervals, coming on in sudden gushes, and was checked only by tamponing the cervix with Monsel's styptic.

Pain in the region of the tumor continued so severe that she was kept continually under the influence of morphia.

At the post-mortem examination the tumor was found to be an interstitial fibro-myoma, the fibrous tissue rather predominating. It involved the body of the uterus on the right side to within an inch of the inner os, and extended an inch to the left, anteriorly and posteriorly. The small painful nodule on the right Dr. Cutler regarded as the closed fallopian tube, which enlargement of the tumor had displaced, and which from some cause had become inflamed. In the centre of the tumor was a separation of the fibrous tissue, the seat of the effused blood which was obtained by aspiration.

In the first case reported, the mucous membrane over the tumor was divided longitudinally, and slight incisions made into the firmly contracted inner os, hoping that, if the tumor was submucous in character, it might, under the influence of ergot, be expelled as a foreign body. Had it not been for symptoms of impending septicæmia, such a result would soon have followed without further operative interference; as, at the time of its removal, only firm but gentle traction was required. This method of incising the capsule is but hasten-

ing a process which Dr. Attie has described as often physiological. He considers that fibroidal tumors of the submucous variety, having a low vitality, occasionally take on disintegration from the extension of inflammation and ulceration of the capsule and mucous covering to the tumor itself, and the uterus then, naturally or from stimulation, expels the mass into the uterine cavity, and then externally. This result followed satisfactorily in a case I subsequently found reported by Dr. Goodell, in the first volume of the American Gynecological Transactions, where the tumor was situated near the fundus; not being able to enucleate it, he made a small incision through the capsule, and the tumor was slowly discharged in fragments.

The interest in the second case centred in the difficulty experienced in forming a satisfactory diagnosis. The case was seen by a number of gentlemen, and variably diagnosticated as one of extra-uterine pregnancy, fibro-cystic tumor of the uterus, and fibroid. Its rapid growth, the inability to detect a solid mass on vaginal examination, the absence of undue hemorrhage until two months before death, seemed to exclude fibroid in a differential diagnosis; whereas the elasticity noticed to the right of Douglas' cul-de-sac, the fluctuation detected over the right side of the tumor, the very loud, distinct souffle heard to the left, the hard, sensitive point to the right, seeming like the projection of one of the small joints of a fœtus, and the severe pains coming on in the right iliac region, paroxysmal in character, with bloody discharge after the tumor had been detected but two months, pointed to extra-uterine pregnancy as the more probable diagnosis. The withdrawal of blood on aspiration, as took place in this case, has been frequently reported in cases of extra-uterine pregnancy. It was impossible to determine whether the clots which passed away when the hemorrhage first began might not have been a discharge of the decidua.

The tumor appeared and increased in size corresponding to the normal course of pregnancy. Fibro-cystic tumor of the uterus seemed tenable until aspiration disproved it.

The exceedingly weak and anæmic condition of the patient seemed to render any operative interference unjustifiable; and in this opinion the gentlemen who saw the case coincided.

SURGICAL ABSTRACT.

By George W. Gay, M.D.

Tumors.

There were one hundred and seventy-two operations on one hundred and fifty-eight patients for the removal of tumors, or other morbid growths, during the five years ending June 1, 1879. They may be roughly classified as follows: —

	No.	Died.		No.	Died.
Cancer of Breast	30	4	*Brought forward*	91	12
" Face	27		Ovarian Tumors	5	3
" Upper Jaw	5		Cystic Tumors	13	1
" Lower "	2		Fibro-Cystic Tumors	3	1
" Tongue	2	1	Glandular Tumors	9	
" Larynx	1	1	Fatty "	10	
" Tonsil	1		Polypus, Uterine	2	1
" Anus	1		" Naso-Pharyngeal	3	
" Neck	1	1	Enchondroma	3	1
" Miscellaneous	8		Hematocele	3	
Sarcoma of Breast	4		Scrofulous Testicle	3	1
" Upper Jaw	2	1	Myxoma of Face	1	
" Lower "	2	1	Vascular Tumors	5	
" Sheath of Carotid	1	1	Miscellaneous	7	1
" Miscellaneous	4	2		158	21
Carried forward	91	12			

Combining the sarcomas and carcinomas we have ninety-one cases of malignant disease, with twelve deaths; of the breast there were thirty-four cases, and four deaths; of the upper jaw, seven cases, and one death; and of the lower jaw, four cases, and one death.

It is not claimed that the above classification of malignant affections is strictly correct, for it is not always easy to deter-

mine the character of the growth from its history and gross appearances. A rapidly growing tumor, which does not infiltrate the tissues, nor extend to the neighboring glands, nor greatly depress the vital powers in its early stages, is, very probably, a sarcoma; and it differs from carcinoma in that the latter affection often presents symptoms the opposite to those above mentioned, especially as regards the lymphatic complication.

So far as the treatment is concerned an exact diagnosis is not essential. The prognosis is said to be more favorable in certain cases of sarcoma, but the ultimate result is too often fatal. According to Gross,[1] the duration of life is more than twice as long after excision of the breast for this disease (seven years), than in cases of carcinoma (three years).

The modern theory of the nature of cancer holds that it is primarily a local affection, and hence, if destroyed early enough, a permanent cure is the result. The practical question to be solved is the following: Is there a period of time, after a diagnosis is possible, when a cancer can be removed with a fair prospect that it will never return? If there are a sufficient number of cases on record to prove this theory true, it has not been our good fortune to hear of them. On the contrary, does not every-day experience tend to show that, at the time when most cancers are discovered by the patients themselves, or are brought to the notice of the surgeon, they are no longer local in their character, but constitutional, and, therefore, not curable by any means at present known to the profession.

Treatment. — Few surgeons, who have seen malignant affections allowed to run their natural course, will hesitate to advise operations for their removal as often as they make their appearance, and as long as it is practicable to perform them. By so doing suffering is diminished, the mind is occupied, hope is stimulated, and life, bad enough at best under these circumstances, is prolonged and made more endurable; and, moreover, a permanent cure will occasionally be obtained. Gross' statistics are interesting as showing the

[1] Tumors of the Mammary Gland, S. W. Gross, 1880.

comparative results of the operative and expectant methods of treatment in breast cancer.

Of ninety-seven cases in which the disease was not interfered with, seventy were dead, thirteen were in a bad condition, and fourteen had been lost sight of; while of five hundred and nineteen cases submitted to the knife, forty-three were still alive, at periods ranging from three to fifteen years. A third of them were "free from the disease after a lapse of six years; while of sixty-seven patients on whom no operation was practised, only one survived after that period." The most remarkable case on record of recovery after repeated operations is probably that of Prof. S. D. Gross, in which a woman had fifty-one tumors, varying in size from that of a pea to that of a hen's egg, removed from the breast, at twenty-two operations, in four years. She was perfectly well ten years afterwards.

This theory of the local origin of cancer, even if not sustained by experience, will very probably lead to beneficial results in practice, by encouraging early and repeated operations for the extirpation of malignant and suspicious growths; as well as the removal of stationary and apparently benign tumors, located in regions common to cancers, as the breast, axilla, face, etc. It is now generally acknowledged that an innocent growth may, after having existed for years with but little change in size and appearance, suddenly commence to increase, become painful, take on the characteristics, and pursue the usual course, of malignant affections. It would seem best, therefore, in these cases to give the patient the benefit of the doubt by removing the disease at once, instead of dismissing him, with the advice to "have it out if it grows." In many instances the patient is unable to determine whether it changes or not, and the surgeon is the only proper person to decide the matter.

Finally, according to the above doctrine, more extensive and thorough operations for the extirpation of malignant diseases are indicated than have heretofore been customary. In the removal of breast cancer, for example, not only is the affected gland to be excised, but also the overlying skin, fat, and fasciæ, leaving an open wound to be closed by granula-

tion. The axilla should also be cleared of everything except blood-vessels and nerves, whether the glands are enlarged or not, for they are frequently diseased before they can be detected by external examination. Our most satisfactory cases have been those in which, by careful dissection, the axillary vessels and nerves, the ribs, and the inter-costal muscles have been freely exposed; and also a portion of the pectoralis major, under which glands are liable to remain concealed from the operator, has been cut away.

Gross claims to have demonstrated, that, by this method of treatment, a permanent cure will follow in ten per cent. of the cases of cancer of the breast.

Of course the dangers of the operation itself are necessarily increased, but the serious nature of the affection justifies the additional risk.

Many careful observations are still necessary to determine the practical value of the above theory, and it is to be hoped that, in view of the importance of the subject, they may be forthcoming as speedily as the nature of the work will admit.

Treatment with Caustics. — Two patients, having cancer of the breast, were treated here by Marsden's method, but with little, if any, benefit. A paste, composed of two parts of arsenious acid and one part of mucilage, was applied to the ulcerated surface. The sloughs usually came away in six or eight days. One woman had eight applications in fourteen weeks; there seemed to be some improvement after the second trial, but it was only temporary. The paste caused great pain, and the disease made steady progress. An operation for its removal was advised, but not accepted, and she was discharged from the hospital, "not relieved." Another woman submitted to excision after one application of the caustic.

Cancer is so universally fatal in its termination, and caustics are so painful, and so uncertain in their results, that many physicians have abandoned all methods of treating this disease except by the knife. If excision is not feasible the sufferer is left to his fate. Few people, however, will sit with folded hands, and watch the encroachments of a malig-

nant disease without making some sort of an effort to stay its progress. We know by experience that small, epithelial growths will sometimes heal kindly after the application of caustic potash, and will remain sound for a long time. The same is also true, to a certain extent, of the secondary tubercles, so common after removal of cancerous breasts. A lady under our observation had eight small, secondary growths, varying from one-fourth of an inch to an inch in diameter, removed in this way, without pain enough to require an opiate. The cavities left by the sloughs closed readily, and, although death occurred not long afterwards, from an internal affection, yet she often expressed herself as having been much relieved by this treatment.

We would advocate the use of caustics only in those cases in which, from the location or numerous deposits of the disease, excision is not practicable. Under these circumstances it would seem that these remedies should receive more attention from the profession, for, if we have nothing to offer these patients in the way of even temporary relief, is it to be wondered at that they should seek it at the hands of non-professional people?

Cancer of Tongue. — (I.) Mr. R., aged 65, had a large ulcerated mass on under side of tongue of five months' duration; glands beneath jaw enlarged. Dr. Thorndike removed the tongue at its root by sawing through the lower jaw obliquely in front, dissecting up the affected mass from the floor of the mouth, and cutting off the whole tongue at its base with the écraseur. Enlarged glands removed also. Jaw wired together, and wound closed. Hemorrhage moderate, and gave no trouble. He died from blood-poisoning in eleven days.

(II.) Mr. D., aged 39; disease noticed three months; tongue swollen and indurated. Operation by Dr. Thorndike, and performed as in first case. Patient sitting up in fifteen days; sutures out of the bone in a month; good union; could articulate labials and gutturals quite well; his conversation was quite easily understood. Remained well a year and a half later.

The above method of removing the tongue, which is known as Syme's operation, undoubtedly gives the most room; but it is also the most formidable, and requires a longer period for recovery. Regnoli opened the mouth from below by two incisions; one curved and parallel with the jaw, the other running from the symphysis to the hyoid bone, the jaw not being divided. Through this aperture the tongue was drawn down and cut off beyond the diseased portion. Nunneley simply made a puncture into the mouth behind the symphysis, through which the wire of the écraseur was carried around the tongue. Finally, we have Paget's method, which is performed as follows: The jaws having been separated with a gag, the tongue is dissected from its attachments below with the knife or curved scissors, the lingual arteries being avoided by keeping to the floor of the mouth as much as possible; when liberated sufficiently, its base is transfixed with strong pins, behind which is applied the écraseur, and section slowly accomplished.

It will be noticed that all external incisions are avoided by this method, and the tongue must be exceptionally large that cannot be removed in this manner. Having performed the operation ourselves we can add our testimony to its value. Although there is little danger of hemorrhage, yet it has been the custom here to leave a loop of silk in the stump a few days, hanging it over the ear to get it out of the way, so that if hemorrhage should occur no time need be lost in getting control of the root of the tongue. The levator muscles of the hyoid bone and base of the tongue not having been divided, there is little to fear from the stump falling backward and obstructing respiration; the greatest difficulty usually met with after this operation is the getting rid of the tough, stringy mucus, which collects in the fauces. Lotions and gargles of myrrh, chlorinated soda, etc., are used with benefit. Liquids, in most cases, are readily swallowed from the first, and, after the soreness has passed away, soft solids, and finally ordinary food can be eaten. The ability to articulate remains to a surprising degree; ordinary conversation is readily understood, much more easily in fact than previous to the operation, if the disease is far advanced. The pain

and constitutional disturbance following the operation in fairly healthy subjects are not at all severe, and cicatrization readily takes place under simple treatment. Although the disease is liable to recur here, as elsewhere, yet the relief obtained from pain and the foul discharges, amply repays the patient for the risks and suffering attending the operation.

Enchondroma of Femur; Amputation at Hip-Joint; Death. —George E., aged 42, merchant, on entering the hospital gave the following history: about four years ago he found a tumor, the size of a hen's egg, just above the internal condyle of the left femur. It increased steadily; during the past six months has grown very rapidly, and has become very heavy and painful; the sharp lancinating pains in the foot are particularly troublesome. The knee is stiff, and the whole thigh involved in a hard, lobulated growth; the skin is not thickened nor ulcerated, nor is there much œdema of the foot; could walk with the aid of a cane. The risks of an amputation at the hip-joint were fully explained to him, and he decided to take them. October 18, 1878, Dr. Thorndike performed the operation. The sphincters were dilated, and a hand introduced into the rectum; but although the common iliac artery could in this manner be easily controlled, yet, as the arm of the assistant was in the way of the operator, the plan was given up. The femoral artery was then tied in Scarpa's triangle, and the thigh amputated by making a large outside skin flap, disarticulating the head of the femur, and cutting out the inner flap in the usual manner. The hemorrhage was moderate, and only three or four ligatures were required. Flaps were closed up with sutures, and simple dressing applied. The limb weighed fifty-four pounds and was thirty-eight inches in circumference. (Vide Fig. 1.)

The patient rallied, and went on well for twenty-four hours, when nausea and vomiting set in, followed by hiccough and great prostration; the discharge from the wound was very offensive. He sank, and died one hundred and seven hours after the operation.

Dr. E. G. Cutler, pathologist to the hospital, reports that the tumor was made up of a tissue which was elastic, more

Enchondroma of Femur.

or less gelatinous, and which was arranged distinctly in alveoli surrounded by a fibrous tissue bearing blood-vessels. The growth sprang from the posterior surface of the femur in the inter-condyloid space. The bone was but slightly involved. Microscopically the tumor was composed of a basement, hyaline, transparent substance, in which, imbedded in little grooves, were cells of varying shapes, round, oval, stellate and caudate, and having but a single wall. In other places the basement membrane was fibrous and the cells close together. The tumor was an enchondroma.

Sarcoma of the Antrum; Six Operations for its Removal; Death. — Mrs. K., aged 60, first detected an enlargement of the left side of her face in the spring of 1874. In the following October a tumor the size of an orange was removed from this region, and another in January, 1875. Two months later Dr. Cheever again removed a large mass from the face and temporal region, and swabbed out the cavity with a strong solution of chloride of zinc.

The growth soon made its appearance again, and, in spite of a free use of opiates, caused the patient great suffering through the summer, so that she was constantly begging for an operation, being willing to run any risk for the sake of even temporary relief. In September, Dr. Gay performed two operations, removing the disease as thoroughly as possible. The orbit, temporal, zygomatic and nasal fossæ, on the left side, and the mouth and pharynx, were all laid into one enormous chasm: On account of profuse hemorrhage the operations were necessarily done hurriedly, and no efforts made to tie vessels; the large cavity was quickly packed with sponges dipped in ferric alum.

The patient always rallied well from the operations, and obtained considerable relief. She took milk and rum freely. The wounds showed a remarkable tendency to heal, but the disease was too vigorous and extensive.

In January, 1876, the sixth and final operation was performed. During its progress blood ran into the trachea, necessitating tracheotomy. She rallied well, but the affection soon reached the base of the brain, causing delirium and ex-

haustion. She lingered until April, and died about two years from the first appearance of the disease.

Under the microscope the growth was found to be a "small, round-celled sarcoma;" which, according to Gross, is the most malignant of all tumors, except carcinoma.

Clinically the disease differed from the latter affection, in that the adjacent glands were not involved, infiltration was less extensive, and the vital powers were not as severely prostrated.

Cancer in the Larynx; Tracheotomy and Laryngotomy; Death from Broncho-Pneumonia. — Wm. B., aged 50, had been hoarse for two years. The laryngoscope revealed a malignant growth in the larynx. The patient being etherized, Dr. Cheever did tracheotomy, introducing the tube low down in the neck. By another incision the thyroid cartilage, which was ossified, was divided on the median line with a fine saw. On separating the fragments, a vascular fungus was seen occupying the site of the left vocal cord. It was about an inch in diameter, and bled freely upon the least irritation. Chromic acid was applied to shrivel the growth, which was then trimmed off with curved scissors, and the base thoroughly cauterized with nitric acid. The thyroid cartilage was wired together and wound closed, the tube being allowed to remain.

The day after the operation coarse and fine râles appeared in the left lung, and the patient was unable to swallow. Injections were resorted to; but the lung symptoms increased, his strength failed, and he died of broncho-pneumonia at the end of a week.

Hyaline Myxoma; Four Operations; Recovery. — Miss S., aged 22, had a soft, elastic tumor on the left side of the face, which, after growing six months, was removed in 1872. The growth reappeared, and was repeatedly removed by an incision upon the inside of the cheek, and the cavity thoroughly cauterized. The fourth and last operation — an extensive one — was performed by Dr. Cheever, in October, 1876.

An incision commencing near the angle of the mouth was

carried up into the temporal fossa; the zygoma was divided, and also the ramus of the lower jaw. The growth was in the form of dark-colored cysts, having thin walls, and filled with a clear, glairy substance, and infiltrating all the soft parts in the above regions. A careful and prolonged dissection was required to remove the whole of the disease. The bleeding was not excessive.

The fragments of the lower jaw were wired together and the wound closed. She rallied well, and, notwithstanding several attacks of secondary hemorrhage, made a good recovery in about four months. The jaw was firmly united, motion fair, the wound healed, and mouth drawn slightly to the right. Four years later there had been no return of the disease.

Epithelial Cancer of Rectum; Excised; Relieved. — John H., aged 64, has had pain and a constant discharge at the anus for several months. That aperture is surrounded by an indurated growth, which extends two inches up the rectum. The patient being under ether, the diseased tissues were entirely dissected away by Dr. Cheever, leaving the levator ani muscle intact. The mucous membrane was drawn down and stitched to the margin of the wound, and compress and T bandage applied. The wound healed kindly in about six weeks; the stools were involuntary for a short time, but afterwards were controlled readily. The pain and discharge were greatly relieved by the operation.

Ovariotomy. — I. — Mrs. L., aged 35; tumor one and a half years; catamenia regular, but profuse; tapped three months ago; still-born child several years ago; abdomen large, tense and tender; vomits. Operation by Dr. Thorndike. Tumor exposed and tapped, and twenty-four pounds thick, dark-colored fluid evacuated; hand introduced, and the multilocular cyst broken up; adhesions extensive and firm; hemorrhage free; patient died from shock in twenty-four hours.

II. — Miss McC., aged 25; operated on by Dr. Gay, October, 1876, for a dermoid cyst of about eighteen months' growth.

She had been tapped four months previously, and twelve ounces of thick, greasy fluid, containing hair, withdrawn. The tumor was removed through an incision four inches long, and the pedicle clamped. It contained between one and two pints of thick fluid, besides several smaller cysts and solid masses; hair about eight inches in length was also found, but no bones or nails.

The bowels moved in ten days; clamp came away in two weeks. She was well in six weeks and remained so two years later, when last heard from.

III. — Mrs. S., aged 34; large fluctuating abdominal tumor, growing six years; no children, but two miscarriages two and three years before the present trouble began; has had a "show" every day for two years; girth forty inches. Operation by Dr. Cheever, March 11, 1877. Fourteen quarts of fluid of a brownish color evacuated; no adhesions; clamp; operation lasted twelve minutes. There were no unfavorable symptoms till the third day, when she became restless and irritable; pain and tympanites followed, and she died in fifteen days. Autopsy showed enteritis, but no peritonitis.

IV. — Miss M., aged 20; gave up work only twenty-four hours before entering the hospital, though she had suffered more or less from pain and abdominal enlargement for a year; menses regular. A fortnight later sixty ounces of a turbid, greenish fluid were removed by the aspirator, with great relief to the dyspnœa.

Dr. Cheever removed the tumor a week afterwards; some ascitic fluid; fourteen pounds in the cyst; few adhesions; clamp; no shock; nausea, vomiting, and fever on second day; wound opened and a little foul pus washed out of the peritoneal cavity with carbolized water; death occurred fifty hours after the operation. At the autopsy bloody fluid was found in the abdomen, and the intestines were glued together and to the parietes by recent lymph.

V. — Mrs. O'L., aged 40; had been aware of the existence of abdominal disease only three months previous to the operation; she had been tapped once. Operation by Dr. Fifield, August 25, 1878. Tumor exposed by short

incision, and pailful of fluid removed with trocar; no adhesions; pedicle clamped; peritoneal cavity washed out; Lister precautions; six dressings. Clamp came off in seventeen days. Discharged, well, in about six weeks.

There have been ten ovariotomies in this hospital, with two recoveries. Previous to case No. II., recorded above, the results had invariably been fatal. Two of the five operations in the past five years were successful. The favorable results have been due to improved hygienic surroundings, rather than to any particular mode of treatment. Lister's dressings have been used somewhat, but not enough to materially change the results. All the patients were isolated as much as possible from hospital influences, there being no communication allowed between their rooms and other parts of the institution. It would seem as if these patients ought to do well in a general hospital, when placed in large, isolated, and well-ventilated rooms, attended by a special corps of nurses and surgeons, and all possible precautions taken to prevent inflammation and septicæmia. A pure atmosphere, thorough cleansing, and drainage, if necessary, of the peritoneal cavity, careful and attentive after-treatment are essential to success in ovariotomy.

Fibro-cystic Tumor of Uterus. — Miss. H., aged 30. Menorrhagia three years; tumor reaching to umbilicus, obscurely fluctuating; abdomen opened by Dr. Thorndike under the spray; tumor reddish in color, and had very thick walls; tapped, and thick, straw-colored fluid came out, which coagulated on cooling; no adhesions. The tumor sprang from the uterus, and the ovaries and broad ligaments were firmly attached to it; both ovaries enlarged, one to the size of a hen's egg, and the other to half that size; uterus divided through the cervix; pedicle clamped, tied with catgut, seared with actual cautery, and clamp removed; pedicle supported in the wound by being transfixed with two large, hare-lip pins; wound closed.

The patient did well till the fourth day, when she began to be fretful. A diarrhœa soon set in, followed in a few days by trismus, of a mild form. She died nine days after

the operation. The wound was healed; intestines adherent to pedicle by a recent peritonitis; no hemorrhage.

Cyst of Broad Ligament. — Mrs. B., aged 28. Menstruation regular, but painful; has lost flesh and strength; tumor has been growing eighteen months; fluctuation easily felt by vagina and rectum; uterus normal in size, but pushed upward and to the left. Tumor aspirated by Dr. Thorndike *per vaginam*, and forty ounces of fluid evacuated; it contained fat and cholesterin, but no ovarian cells. No tumor could be felt after the operation; the abdomen was flat, and the uterus retroverted. She was discharged, well, in a fortnight. There was no return of the affection at the end of three and a half years.

Removal of a Stone from the Peritoneal Cavity; Recovery. — John S., sailor, aged 41, had been in the habit of crowding either a belaying pin or an eight-ounce bottle into the rectum to relieve a retention of urine, which was of a spasmodic nature, and which recurred frequently. June 13th, 1870, not having any bottle, he obtained a pebble, five inches long by three in width, and weighing two pounds, and, having greased it, he applied it to the anus and sat upon it. Suddenly the stone slipped into the rectum above the sphincter, and although the patient could touch, he could not remove it. A physician was called, who endeavored to pull it out with wire loops, but the more he tried the farther the stone receded from the anus. A final effort was made by causing the captain's boy to pass in his hand "up to the shoulder;" he could reach the pebble, but could not draw it down. The patient was then brought to this city, and Dr. Thorndike called June 15th. He found him suffering from peritonitis, indicated by tympanitis, pain, high pulse and temperature, vomiting, and brown tongue. The patient having been etherized, Dr. T. passed his hand into the rectum; he could feel the stone high up in the abdominal cavity, but his hand and arm were so cramped, by the want of space, that it was impossible to seize the foreign body. An incision, five inches long, was then made, parallel with the outer border of the left rectus muscle, extending upwards to a point two inches

above the umbilicus; the peritoneal cavity was opened, and the stone found lying among the intestines, just below the stomach. The bowels were highly congested, but not adherent to each other. The aperture through which the

Stone Removed from Peritoneal Cavity.

stone escaped from the intestine was about eight inches above the anus. The external wound was closed with six silk sutures.

The patient had a thin, yellow dejection three days after the operation. No blood ever came from the rectum. The vomiting, hiccough, tympanitis and pain gradually subsided, and he got out of bed in twelve days.

July 4th. Bowels regular; taking a mixed diet; wound is nearly healed.

July 15th. Wound is well with the exception of two small superficial ulcerations. Patient is discharged, able to pass his urine without difficulty.

Operations on Blood-vessels.

Cirsoid Aneurism of the Forearm; Ligature and Excision; Ligation of Brachial Artery for Secondary Hemorrhage; Pyæmia; Diphtheria; Death. — Miss I. S., aged 19 years, first noticed a swelling on the back of the left forearm, just below the elbow, three years ago. It was a soft, pulsating tumor, the size of a hen's egg, giving a distinct bruit to the ear. An elastic bandage was applied tightly for a few days without producing any change.

January 18th, 1878. Dr. Thorndike cut down on the tumor and exposed a large mass of bluish vessels, which permeated the muscles in all directions so intimately that all efforts at enucleation were worse than useless. The growth was ligated extensively, and a portion cut away. The operation was antiseptic.

January 21st. Attacked with erysipelas.

January 24th. Secondary hemorrhage, losing about three ounces of blood. Pulsation felt in the growth for the first time since the operation. Cold and pressure controlled the bleeding.

January 27th. Profuse hemorrhage last night. Patient etherized, and the brachial artery, which, owing to a high division, consisted of two large branches, was tied. Another large artery, perhaps the interosseous, was discovered arising from above the point of ligation. This being tied, all pulsation ceased in the tumor.

The patient, naturally dyspeptic, now began to suffer from an irritable stomach, vomiting freely, and losing strength. Chills and profuse sweats soon followed, accompanied by

sloughing of the original wound; white patches upon the soft palate, and great prostration. She died twenty-five days after the operation without further hemorrhage.

Erectile Tumor; Ligature and Excision; Recovery. — Michael C., aged 8 years, had a soft non-fluctuating tumor on the left arm, of six years' duration. It was situated on the inner surface of the arm, and extended from the elbow to the insertion of the deltoid. The arm was not swollen nor painful. There was no pulsation in the tumor, and that in the ulnar and radial arteries was normal. An elastic bandage was worn for several weeks without producing any change upon the growth.

February 2d, 1876. Dr. Thorndike, on exposing the growth through a free incision, found it made up of enlarged veins, which penetrated the muscles and surrounding tissues. It was dissected out as much as possible without doing too much violence to the other structures, then ligatured thoroughly, and the principal portion cut away. The arm was bandaged from the fingers to the shoulder. The dressings were applied every day for twelve days, the boy being etherized each time. At the end of that period the ligatures and slough were all away, and the wound was granulating finely. He recovered in two months and a half with good motion in the elbow joint, and a useful arm. The tumor had entirely disappeared.

Rupture of Internal Jugular Vein from Strumous Ulceration; Profuse Hemorrhage; An Attempt to Tie the Innominata; Death; Autopsy. — Michael C., aged 43 years, has had suppurating glands in the neck for a year, accompanied by severe cough and chills. Enters the hospital with deep sinuses low down on the right side of the neck, from which there came a hemorrhage of bright arterial blood. The finger, passed into the principal opening, went down behind the right sterno-clavicular articulation, and rested on the carotid and subclavian arteries.

February 28th, 1877. The patient was etherized, and Dr. Cheever, as a last resort, made an attempt to secure the

bleeding vessel. A vertical incision, parallel to the scalenus anticus, was made to meet a horizontal one over the clavicle. The sternal portion of the sterno-mastoid muscle had sloughed away. The common carotid was exposed, but pressure upon it did not control the pulsation in the temporal artery. The subclavian was next sought for, with the expectation that the hemorrhage came from that vessel, or its branches; but the result was the same. Finally it was determined to try and tie the innominate artery. The dissection was carried down behind the clavicle and sternum, and a ligature placed upon a large vessel, when suddenly there came a gush of blood, filling the deep and narrow wound, and hiding everything from view. This hemorrhage was stopped by plugging the wound with sponges, and applying a compress and bandage.

The patient died forty hours after the operation, and at the autopsy the innominate artery was found to be very short. The last ligature was around the lower portion of the common carotid, and there was an opening into the internal jugular vein.

From this opening protruded a bright, cranberry-colored clot, resembling arterial blood. No other source of hemorrhage was found.

Ligature of Femoral Artery for Popliteal Aneurism; Recovery.—Timothy S., laborer, aged 28, noticed a small lump in left popliteal space in March, 1877. When he entered the hospital in June, the tumor was as large as a lemon, pulsating, painful, and having the usual *bruit*. A tourniquet was applied to the femoral, but the pain was so severe, and the man so fractious, that it was allowed to remain only two and a half hours. The leg was then kept strongly flexed for nearly three days, with no other effect than exaggerating the pain.

June 19th. The patient being etherized, the femoral artery was tied at the apex of Scarpa's triangle by Dr. Homans. Five hours afterwards the temperature was two degrees lower in the *left* foot than in the other. No pulsation in the tumor. The prickling sensation, which had been present since the flexion treatment, was not increased by the ligature.

June 23d. Pulsation in the dorsalis pedis. Numbness diminishing; temperature one degree less in the left foot than in the right.

July 9th. Ligature came away to-day.

July 18th. Wound healed, and patient about on crutches. Knee somewhat stiff, and the whole limb is sore; but the nervous sensations are improving.

August 6th. Discharged.

Popliteal Aneurism; Femoral Artery tied with Catgut; Union by First Intention; Well three years later. — Mr. L., laborer, aged 46 years, entered the hospital September 26th, 1878, and gave the following history: Three months ago he first felt a pain in the right popliteal space; a month later he noticed a tumor there of the size of a walnut, which has increased rapidly since that time. The heart is normal, and he has received no injury, although he appears to have been more or less dissipated. The right popliteal space was filled with a firm, elastic, pulsating tumor, which extended from the outer hamstring around on to the inner aspect of the thigh, ten and a half inches. The circumference of the right knee was two and three-fourths inches greater than that of the left. The thrill and bruit were well marked, and the pain at times excruciating, requiring large doses of opiates to produce relief.

October 4th. The circumference of the right knee had increased about two inches. The patient was etherized, and the femoral artery was tied by Dr. Gay, about four inches below Poupart's ligament, with a double catgut ligature, secured by three knots, and cut short. The wound was closed with sutures and dressed with compound tincture of benzoin, and foot and leg wrapped in cotton. The size of the right knee was one inch less after the operation than before it.

The wound healed by first intention; the ligature was never seen after the wound was closed. There was little, if any, swelling of the foot and leg; pain has been moderate. The patient was walking two months after the operation; the circumference of the right knee had diminished three inches; the tumor was soft, painless, and devoid of pulsation.

Three years later this patient was in the hospital for rheumatism. The aneurism had entirely disappeared, and there was no pulsation in the anterior and posterior tibial arteries of the right leg. The foot and leg gave no trouble, and were as well as ever they were.

Anchylosis of Knee Broken Up; Rupture of Popliteal Vessels; Ligature of Femoral Artery; Recovery. — Michael M., aged 14, had a stiff knee, which was the result of an arthritis, and had been present several years. Ether was given, and the adhesions broken up. Great swelling in the calf of the leg and severe pain followed the operation. Eight days later a large mass of blood was removed from the calf of the leg through an incision; repeated and severe hemorrhage followed, which could not be controlled by pressure and styptics. Dr. Homans tied the femoral artery, with the effect of stopping the bleeding. Nine days after the ligature was applied, the patient had secondary hemorrhage from both wounds, attended by chills, and followed by free suppuration. The ligature came away in sixteen days. The wounds were healed in nine weeks from the time of tying the artery, and there was fair motion in the knee-joint.

While removing a soft cancer from the sheath of the common carotid, Dr. Cheever found it necessary to tie that artery. The patient died suddenly in five days, probably from embolism.

The anterior tibial artery was tied by Dr. Bolles to arrest hemorrhage from a sloughing wound in the foot, the result of a crush. The bleeding was arrested, and did not recur.

The ulnar artery was once ligated to control repeated hemorrhages from a wound in the hand, and with success.

In two instances traumatic aneurisms of the temporal artery were laid open, and both ends of the wounded vessel secured by ligature; recovery ensued.

Strangulated Hernia.

During the past five years herniotomy has been performed twenty-six times for strangulated or irreducible hernia. Thirteen ruptures were inguinal, six died; twelve femoral, five died; one umbilical, died.

In most of the cases pain, vomiting, and constipation were, or had been, present to a greater or less degree, these symptoms being absent in only one instance.

The sac was opened in every case but two, which were patients with femoral hernia, attended with mild symptoms, and both recovered after the "minor operation."

Eight cases of inguinal, and three of crural herniæ were composed of bowel and omentum. The former was returned in every instance but one, that of a woman, who had a femoral rupture irreducible for twenty years. As it could not be returned, and threatened to slough, an opening was made into the intestine, and the stricture divided. She died from exhaustion in twelve days. In several cases the omentum was so closely attached to the sac that it could not be separated by any justifiable measures; under which circumstances, the redundant portion was cut off, and the stump left to serve as a plug in the ring. A truss is usually required in these cases to prevent a return of the affection, as the tissues shrink and regain their normal condition.

The duration of the symptoms in our cases varied from a few hours to six days, and, contrary to the general rule, the average time was longer in the favorable than in the fatal cases; it being about forty-seven hours in the former, and only thirty in the latter.

Of eleven patients over fifty years of age only two recovered; while of fifteen under that age twelve resulted favorably. The average duration of convalescence was about a month; in the fatal cases death resulted at periods varying from five hours to eighteen days; about five days being the mean duration of life. The cause of death, so far as could be determined, was as follows: exhaustion, six; peritonitis, four; tetanus, one; erysipelas, one; total, twelve, out of twenty-six operations.

As may be seen in the following table, the operation of herniotomy has been performed forty-four times here since the hospital was opened, fifteen years ago. Twenty cases resulted fatally, giving a mortality of forty-five per cent., — a result which is probably not very different from that experienced in other institutions of this kind.

	Number of Cases.	Recovered.	Rate of Mortality.
First Series.....	10	3	.70
Second Series.....	8	7	.125
Third Series.....	26	14	.46
Total.....	44	24	.45

A brief record of a few of the more interesting cases is here given, with two cases of tumor in the groin simulating hernia.

Mrs. M., 64, weight two hundred and fifty pounds, strangulated umbilical hernia, nineteen inches in circumference; pain and vomiting twenty-four hours; irreducible a year and a half. Aspirator gave exit to two oz. bloody serum; sac opened and contained adhering omentum, with six inches small intestine of a dark-brown color; stricture divided; bowel, only, returned to abdomen. Death from peritonitis in thirty-six hours.

Mr. — , 77, inguinal hernia, strangulated twenty-four hours; intestine returned; omentum cut off and stump stitched to edges of external ring. Tetanus set in on the fifth day, and he died suddenly from spasm of the glottis. (?)

Mr. R., 26, inguinal hernia, strangulated forty-eight hours; stercoraceous vomiting, pain, and great prostration. Collapsed during etherization, and operation done without an anæsthetic; sac in the scrotum, and contained only bloody serum below internal ring, which was occluded by intestine firmly attached to the ring and abdominal wall. The next

day the patient had bloody stools, pain in the belly, knees drawn up, etc. He recovered in a month.

Male, 48, femoral hernia; down five days; vomiting, pain, hiccough, and tympanites; sac contained omentum and small intestine; the latter returned. Six hours later the patient was unconscious, cyanotic; pulse one hundred and forty-four; rallied under stimulants and aconite, and was discharged, wearing a truss, in six weeks.

John J., 45, inguinal hernia, eight inches in circumference; herniotomy for the *third time;* sac opened; bowel and omentum returned; jumped out of bed, three days after operation, in a fit of delirium. Well in three weeks.

Female, 65, femoral hernia; down sixty hours; slight taxis; great prostration; sac opened and omentum returned. Death from peritonitis in six days. Autopsy: wound sloughy; sac extended two and half inches below saphenous opening underneath fascia lata, long continued pressure having obliterated the natural connections of the fasciæ at the lower border of this opening.

Mr. S., 25, inguinal rupture, size of man's fist; never worn truss; reducible till six hours before operation; severe pain the only symptom; taxis and aspiration failed. Sac opened; bowel replaced; well in two or three weeks; now wears a truss.

Tumor in the Groin resembling Hernia. — A book-keeper, aged 23 years, was seized with a severe pain in the groin after a long walk about the city. On examination there appeared a tumor, the size of an English walnut, which had never before been noticed. Two days later a physician was called, who found him suffering from pain, nausea, fever following a chill, constipation; and he was unable to stand erect.

Below Poupart's ligament on the right side was a tender, irregular, slightly movable bunch, an inch and a half in diameter, extending down to the saphenous opening in the fascia lata. The skin was not red, nor were the tissues infiltrated. An incision revealed an enlarged gland, containing a few drops of pus. The patient was well in ten days.

A house-painter, 36 years old, was said to have had a rupture since childhood, which came down occasionally, but was easily replaced. Wore no truss. Was subject to attacks of lead colic. Five days previous to our first visit the patient noticed a lump in the usual site of the rupture, which had come on suddenly after taking violent exercise in kicking at a mark. Although in pain, yet he continued at his work two or three days, trying at times, without success, to replace what he supposed was a rupture. Patient had vomited, and bowels had not moved for a week.

Examined under ether, there was found a single tumor, the size of a hen's egg, situated over Poupart's ligament and the upper part of the thigh on the left side. It was movable, but on seizing and trying to raise it there was apparently a pedicle extending into the crural canal. The skin and cellular tissue were not thickened nor inflamed. The inguinal rings were free; the saphenous opening obstructed. Through an incision a large gland was readily turned out. There was no hernia, and the patient was well in a short time.

The writer removed a tumor from this region some time ago, which in some respects strongly resembled an omental femoral hernia. Although the growth was pronounced a sarcoma by an experienced pathologist, and extended deeply into the pelvis, interfering with the free action of the bowels, yet, under large doses of iodide of potash, it stopped growing, and at the end of two years had decreased to such an extent that it gave the patient very little trouble, and he called himself well.

The diagnosis of recent tumors in the groin is always important, but not always easily made. They are not infrequently small, tender, painful; without impulse, fluctuation, or signs of inflammation; somewhat movable, but apparently attached beneath; accompanied by constipation and more or less constitutional disturbance; moreover, the history may be unreliable, or entirely wanting.

The treatment in these doubtful cases may be expectant or operative. In view of the fact that an irreducible hernia is always annoying, and may at any moment become danger-

ous, and also that, so far as we know, operative measures for the relief of rupture are more successful when resorted to before severe symptoms arise than afterwards, we cannot but think that under these circumstances an exploratory operation is justifiable, if not demanded, to establish the diagnosis and indicate the treatment.

Should an incision prove the tumor to be an enlarged gland, cyst, or any affection other than a hernia, it is highly probable that recovery would be hastened rather than retarded by the operation; and in the event of a rupture being present, which could be successfully replaced, then would the patient be spared the annoyance and danger of adhesion and strangulation. "I will venture to add, that if, in compliance with this maxim, the surgeon should, under any unusual concurrence of circumstances, cut down on a merely glandular swelling, he will be acquitted by every judicious practitioner, and his conduct will not be attended with any injurious consequences to the patient." (Lawrence on Hernia.)

The Radical Cure of Hernia.

Twelve patients suffering from inguinal rupture were operated upon for a radical cure. Woods' method was resorted to in four instances, with temporary relief. The so-called Heaton operation was performed eight times; six cases were partially successful, and two were complete failures. All of these patients left the hospital wearing a truss or bandage, and their subsequent condition is unknown. No radical operation has been performed upon any of the other varieties of hernia during the past five years.

Heaton's Operation. — Theoretically, the Heaton method of treating hernia for a radical cure consists in moistening the fibrous tissues of the inguinal canal and rings with a preparation of white-oak bark, and applying pressure by means of a compress and bandage to keep the canal closed, and prevent the descent of the hernia, until the contracted parts have become strong enough to support the strain imposed upon them. The originator of the treatment

claimed that by this method of "tendinous irritation" a permanent contraction of the fibrous structure was produced, which resulted in a lasting cure of the affection.

The fluid recommended for injection is composed of the solid extract of white-oak bark (fourteen grains) rubbed up with fluid extract (half an ounce) of the same drug by the aid of gentle heat. It is a muddy mixture, and requires thorough shaking before using.

The operation is performed as follows: the hernia having been reduced, and the sac also, if possible, an instrument resembling the hypodermic syringe, charged with the astringent, is thrust directly down through the skin into the external abdominal ring, and the point of the needle carried up the inguinal canal to the internal ring. The fluid is deposited slowly, while withdrawing the instrument, the point of which is to be moved about in all directions, in order that the astringent may be distributed as evenly as possible throughout the canal. A compress and bandage are applied at once, and worn for a few weeks, when, in the successful cases, the rupture is cured, and requires no further support.

Twenty-four hours after the operation there is usually some effusion and tenderness in the inguinal region; the former may remain for an indefinite period; the latter commonly subsides in a few days, except in those unfortunate cases which terminate in suppuration. In some instances no thickening or effusion can be detected after the operation, while in others complete absorption takes place in a short time, and the parts return to their former condition. At the end of a fortnight in the favorable cases, when the patient is allowed to leave the bed, the external ring will be found much reduced in size, and it is with difficulty that the finger can be introduced into the canal, where it formerly passed easily. It is desirable to avoid leaving any of the astringent in the areolar tissue, as cellulitis and abscess are more liable to follow. These complications retard recovery, and add nothing to the success of the operation.

Although the pain of the operation is only moderate, yet in children an anæsthetic is required to prevent the violent straining from forcing out the contents of the rupture before

the bandage is applied; timid and nervous people also need it, to enable them to keep still during its performance. Opiates are not usually called for during the after-treatment.

We have ventured to give here a brief account of our personal experience with this operation, and have recorded *all* the cases operated on by us, both in hospital and private practice; the results are stated as fully as possible. All were cases of inguinal hernia, and, with the exception of those specified, were supposed to contain intestine. Only those patients are called *cured*, who have remained well for at least a year after discarding all support to the rupture.

Case I. — A waiter, aged 24 years, entered the hospital suffering from an inguinal hernia of moderate size on the left side; a truss had been worn. September 9th, 1877, the patient was etherized, rupture reduced, and ten drops of the Heaton mixture injected into the inguinal canal. A compress and bandage were applied, and the patient remained in bed two weeks. He was discharged, wearing a bandage, at the end of five weeks. The external ring had been reduced to one-half its former size by the operation, and the rupture had not returned.

II. — A sailor, 34 years of age, with a reducible inguinal rupture of seven months' duration, was operated on at the same time, and in the same manner, as the previous patient. He was discharged in four weeks, wearing a truss; the ring was contracted somewhat, but not sufficiently to control the hernia.

III. — A harness-maker, aged 45, subject to attacks of asthma and cough, had a right inguinal hernia of several years' standing; the ring was large, and rupture uncontrolled by a truss. Operation June 10th, 1878. Although the size of the ring was somewhat reduced the intestine came down in a short time during an attack of bronchitis, and he was discharged, not relieved.

IV. — A policeman had an omental rupture of some years' duration, which extended half way to the bottom of the

scrotum, and could not be controlled by a truss. The operation by injection was performed twice, in as many months, with the result of reducing the ring to the size of a pipe-stem. A strand of omentum still came down, though it could be easily kept up by a truss. He afterwards submitted to an operation for the removal of the omental protrusion, but with only a partial success. He is now wearing a truss.

V. — A boy, $1\frac{1}{2}$ years old, with double inguinal hernia, was operated on in 1878, in the out-patient department. The after-treatment was neglected, as the mother failed to bring him back to have the bandage readjusted. The operation did no good; the child now wears a truss.

VI. — James, 21 months old; right inguinal hernia; injected with three drops of the oak bark; wore bandage only a week; remained well at the end of fourteen months.

VII. — Michael, $2\frac{1}{2}$ years of age, had a right inguinal hernia lasting six months; the ring was large, and two operations were performed. Three years later the rupture came down only after great straining; wore no support; much relieved by the injection.[1]

VIII. — A house-painter, aged 24 years, subject to convulsions, was injected for an inguinal rupture. The fits returned three days after the operation, when he jumped out of bed, pulled off his bandage, and the rupture returned. No benefit was received from the operation.

IX. — Daniel, aged 12, a thin, spare boy, had a scrotal hernia, with large rings, and loose pillars; was injected twice within two months. He remains well at the present time, and has worn no support for nearly two years.

X. — A boy, 4 years of age, was operated on for an omental hernia running into the scrotum, with little, if any, relief. We have urged the parents to allow the operation to be repeated, as the rupture is small, and, so far as we can see, is a favorable case for this method of treatment.

[1] We have lately performed a second operation upon this boy.

XI. — John, 6 years old, inguinal rupture, which had come down only a few times; it was reduced under ether, about a week before the operation, by injection. The ring was small, and hence peculiarly adapted to this operation. The little fellow was running about in a week, and has had no return of his rupture, now nearly two years since receiving the treatment. This patient would undoubtedly have recovered by wearing a well-fitting truss.

XII. — For a year Miss —, aged 38 years, had suffered a good deal from an omental hernia, which came down into the right labium, in spite of any truss she could apply. The operation was performed as in the male, and she remained in bed about a month. The resulting inflammation in this, as in all the cases narrated thus far, was very moderate, never threatening suppuration. She wore an abdominal supporter for several weeks. Fourteen months after the operation she remained well.

XIII. — A man, 58 years of age, entered the hospital suffering from the early symptoms of strangulation of an inguinal hernia. It was reduced under ether, and the operation for a radical cure performed some weeks later. When he left the hospital, at the end of three weeks, the little finger could not be passed into the external ring. As the rupture was intestinal, the operation promises to be successful.

XIV. — A baby, 10 months old, was brought to me with double inguinal hernia, which trusses did not keep in place. Both were operated on for the first time over a year ago; as the child has since had the measles and whooping-cough without bringing down the left rupture, we may safely call that one cured. Suppuration followed the first injection upon the right side, and the operation has been repeated twice without success. The rings are large, the inguinal canal is short, and, thus far, no truss has been found to control the hernia.

XV. — Mr. F., aged 23, suffered a good deal from inguinal herniæ, which could not be controlled by trusses. The

rings were large, pillars thin, and abdomen flat. Both ruptures were operated on without ether, a year ago. Large effusion followed the injections, resulting in an abscess on each side, which were a long time in closing. Neither hernia has returned; the patient wears a double truss, and has been greatly relieved by the operation.

Recapitulation.

Number of patients, fifteen. Cured, four. Relieved, eight. Not relieved, three.

Number of ruptures, eighteen. Cured, five. Relieved, eight. Not relieved, five.

Number of operations, twenty-three.

With two exceptions (III. and VIII.) the foregoing were fair cases for this operation. How many of the failures were due to lack of skill and experience in the operator it is, of course, impossible to say. On the other hand, it should be remembered that several of the cases occurred in children at the out-patient department of the hospital, in which the after-treatment was, from various causes, imperfect. Again, in some of the most promising cases, in which not quite enough contraction resulted from the first operation, a second could not be obtained.

While we do not feel justified, from our limited experience, extending over only four years, in expressing a decided opinion as to the real value of the oak-bark treatment of hernia, our impression is, that, in the inguinal variety of the affection, it is often a good method, and is worthy of further trial and study at the hands of competent surgeons. It would seem peculiarly adapted to cases with small rings, and especially to cases occurring in children, where Nature herself is making a constant effort to correct the deformity, and requires but little assistance to enable her to accomplish the result.

We know nothing of the merits of the operation in other kinds of hernia, but in the one under consideration we can but conclude that it is safe; it is not very painful; it is not difficult to perform; it does little harm, even if it does no good; it will cure a certain number, and will relieve others.

Head Injuries.

We have collected from the surgical records ninety-five cases of injury to the head, exclusive of scalp-wounds and all others not attended by loss of consciousness, or other characteristic symptoms. Fifty-six died. There were sixty-seven cases of fracture of the skull, with nineteen, more or less complete, recoveries. Of twenty-nine cases with hemorrhage from the ear, supposed to have sustained a fracture of the base of the skull, a favorable result was attained in seven instances. Out of fifty cases of this kind occurring here in ten years, there have been nineteen recoveries, or about one in two and a half.

Twenty-eight patients, in whom there was supposed to be no fracture, presented symptoms of concussion or compression, and eight died.

Below will be found a brief report of the gun-shot wounds to the head, in the order in which they occurred, and also of the cases which were trephined.

Gun-shot Injuries to the Head. — (1.) E. S., 22, committed suicide by shooting himself in the right temporal region. The ball entered an inch back of the external angular process of the frontal bone, penetrating the brain, portions of which came from the orifice. Conscious, and suffering great pain; bullet not found. He soon became restless and delirious, and died of meningitis in a week.

(2.) Mr. L., aged 42, was found in a chair unconscious, with a bullet-wound in the side of the head. Pulse, fifty-six; respiration, eight. Died in an hour. At the autopsy the ball was found to have entered the skull in the right temporal region, passed through the right hemisphere into the left, and to have lodged near the fissure of Sylvius. Hemorrhage had taken place in the brain substance, and also in the fourth and lateral ventricles.

(3.) A. McC., aged 25, shot himself in right ear; unconscious; restless; slight hemorrhage; left hemiplegia; pupils contracted. Next day conscious and answered questions; divergent strabismus of right eye, and convergent of left; died in two days.

(4.) H. H., aged 13, suicide; ball entered the occiput on the left side; unconscious; lived only five hours.

(5.) P. D. A., adult, committed suicide by placing a shot-gun under his chin and firing upwards. All the lower part of the face was carried away, as follows: the lower jaw and soft parts back to the angle, nearly the whole of the upper jaw, the vomer and turbinated bones, the greater portion of the nasal, malar, and ethmoid bones, making one large triangular chasm extending from the upper part of the neck to the forehead, and involving the cavities of the mouth, nose, orbits, and the frontal sinuses. The tongue was lacerated and the tip torn off. The patient was conscious, but weak from loss of blood. He drank large quantities of milk, soup, and brandy, and did very well for four days, when erysipelas set in, the discharge from the wound became very offensive, and death followed in eight days after the injury. At the autopsy the ethmoid and orbital plates of the frontal bone were found comminuted; both anterior lobes of the brain were lacerated and sloughing; there was no meningitis, and the rest of the brain was normal. It is remarkable that this patient should have lived so long after receiving such a terrible laceration of the face, with an extensive loss of tissues. Had he recovered he must have presented a most hideous appearance, and have afforded the surgeon ample opportunities to exercise his skill in plastic operations to restore the face.

(6.) Alice W., 25, received a ball from a pistol, which was held within three inches of her head. It penetrated the outer table just above the left ear, but did not enter the cranial cavity. Two days later the bullet was removed from near the zygoma. The patient suffered from chills, delirium, erysipelas, and necrosis, but was well in about two months.

(7.) James F. C., 50, suicide, had four bullet wounds on the side of the head, within two inches of the right ear. The skull was cracked behind the ear, but no depression was found. Three balls were extracted, and the patient recovered in a month.

(8.) G. H. C., 32, after shooting himself, walked to the

hospital to have the wound dressed; there were no bad symptoms. The bullet was imbedded in the skull, three inches above the left ear, it having penetrated the outer table, and fractured and depressed the inner. To remove splinters of bone from the surface of the dura mater, Dr. Thorndike trephined at once. On the third day he asked for something to read, and, with the exception of a slight febrile attack, he made rapid progress, and was well in a month.

It will be noticed that the result in the above cases was fatal in every instance in which the cavity of the cranium was penetrated by the bullet. Gun-shot wounds of the head are similar to punctured wounds produced in other ways, and are liable to the same complications, such as irritation, inflammation, abscess, etc. Trephining is also indicated in these cases, when there is reason to suppose that the dura mater is being irritated by splinters of bone or other foreign substances.

Although a portion of the following case has been already reported, yet it is worthy of being reproduced here on account of its interesting termination: a little girl, three years of age, received a ball from a pistol, held to the ear, in the right external auditory meatus. There was profuse venous hemorrhage; the petrous portion of the temporal bone could be felt rough and fissured at the bottom of the meatus. The ball could not be found. The child was conscious and vomited. There was facial paralysis on the right side. Suppuration was at first profuse and then moderate. There was no other head symptom after a few days of headache and fever. She soon got up, and ran about the ward; played, ate, and slept. Her friends took her away at the end of seven weeks, apparently well, with the exception of paralysis and discharge. About six years after this patient left the hospital she was seen by Dr. Cheever, who found her recovering from a small abscess in the throat. The ball had been discharged from this abscess a short time before.

The operation for trephining has been performed here five times in as many years, and with a successful result in three

instances. Twice it was resorted to in simple fracture with depression, twice in compound comminuted fracture, and once in the case of gun-shot injury, recorded above. The cases are as follows:—

(1.) John N., aged 28, entered the hospital for a compound depressed fracture of the frontal bone, situated two inches above the right eye. It was the result of a kick by a horse, and was attended by necrosis and severe pain. Dr. Ingalls trephined the skull, and found the dura mater uninjured. Convalescence was retarded by a severe cough, but he was up and about the ward in six weeks. At the end of four months he left the hospital, having some dead bone in the wound, which was afterwards removed. The mind was clear and the pain gone.

(2.) A. McF., 22, was struck by a derrick, sustaining a compound depressed fracture of the frontal bone of the left side. Dr. Ingalls trephined, and raised the fragments; but the inclination to stupor increased, a mild delirium set in, and death from meningitis occurred in four days.

(3.) H. R., 22, walked into the hospital, undressed himself, and laid down upon the table. Upon examination there was found a large fracture of the skull on the left side, involving the temporal and parietal bones. The fragments occupied a space three inches long by two and a half inches wide, and were depressed three quarters of an inch below the level of the outer table. Dr. Thorndike trephined, and removed the fragments, leaving the meninges uninjured.

For a week everything went well; his mind was clear, pain was absent, and the wound nearly closed by first intention. Headache, delirium, and free suppuration followed, which resulted in loss of memory and a weakened intellect. The wound was healed at the end of a month, and its site was depressed an inch and a half below the edges of the bone.

(4.) Frank R., aged 10, entered the hospital suffering from the effects of a railroad accident; unconscious; vomiting; hemorrhage from left ear; pupils inactive. There was a depressed fracture of the skull over the left brow. Dr. Cheever trephined, and found that the fracture radiated up-

ward toward the vertex, as well as backward toward the left ear. During the night there was a profuse serous discharge from the left ear.

December 12th. Five days after the operation he was seized with diarrhœa, which persisted.

December 22d. Left side of face paralyzed; free suppuration in the wound; abscess on the face, and over the occiput.

January 2d. Blind in left eye.

January 11th. Becoming stupid.

February 9th. Right arm paralyzed. Failing. Died ten weeks after the accident.

Excisions of Joints.

The following excisions have been performed in the past five years, viz.: eight of the hip; eight of the elbow; three of the tarsus; and one each of the shoulder, wrist, and ankle. There were seven deaths; five of the hip, one of the shoulder, and one of the elbow.

Excisions of the Hip. — (1.) Philip, aged 13. Morbus coxæ, following an injury six months ago. Operation by Dr. Thorndike, January 29th, 1875. Discharged October 21st; wound nearly healed; walking on crutches.

(2.) Catherine, 16 years old; hip disease thirteen years; sinus and anchylosis. Excised by Dr. Cheever, February 25th, 1876. Head of femur nearly all gone; bone divided above trochanter major. Died from pyæmia in three weeks.

(3.) Annie, 18 years old; disease of right hip for eleven months. Sinus and great pain. Dr. Thorndike removed head of bone, and scraped out the acetabulum. Died from exhaustion in ten days.

(4.) Willie, 7; disease of fourteen months' standing, and following an injury. Abscess, sinus, eversion, and shortening. Operation by Dr. Cheever, February 20th, 1877. The patient remained in the hospital eighteen months, suffering from profuse suppuration, abscesses, sinuses, emaciation, etc., and was discharged, unrelieved.

(5.) Ellen, aged 11; excised by Dr. Cheever; head of

bone separated at epiphysis. At end of a month could hold up her limb to have it dressed. Went to the beach in six months in excellent condition, although there were sinuses over the hip.

(6.) William, 6 years of age; hip disease; thigh flexed to a right angle; sinus; two and a half inches' shortening. Excision by Dr. Cheever. Operation followed by suppuration, fever, emaciation, and tetanus, and he died in eight days, twenty-four hours after the appearance of tetanic symptoms.

(7.) John, 14; no history. Head of bone removed by Dr. Thorndike below trochanter for hip disease. He lingered five months, and sank from exhaustion.

(8.) Mary, 9; hip disease, seven or eight months. Dr. Cheever opened a large abscess of the hip, and removed the head of the femur, January 22d, 1878. She died from exhaustion in four days.

The results in the above cases were singularly unfortunate, only two out of eight patients having received any benefit from the operation. Of twenty-one cases previously treated here by excision, twelve, or more than half, were relieved or cured. Statistics teach that about fifty per cent. of the patients who submit to this operation will die. It is not resorted to here as often as formerly, for the reason that other and more conservative measures promise as good results, with less risk.

A favorite mode of treating the affection in its earlier stages is the following: the child is put to bed, and extension applied by means of the weight and pulley, till the pain has been relieved; the shoe on the well foot having been raised two inches, the patient is then allowed to get about on crutches, the lame leg being supported and steadied by the Sayre or some sort of a splint, and extension obtained from the weight of the limb itself. Patients treated in this manner can often go about with comfort, and avoid the disadvantages of close confinement.

Excision of Elbow. — (1.) James, 30; had caries of lbow two years. Dr. Cheever excised the joint February

18th, 1876. Arm placed on an internal splint at an obtuse angle. Discharged, nearly well, in six weeks.

(2.) Andrew, 6 years old, was run over by a wagon, and received a compound comminuted fracture into right elbow-joint. The lower end of humerus and olecranon were excised at once by Dr. Homans. Gangrene set in, the boy became delirious, and died in five days.

(3.) Thomas, aged 28; left elbow dislocated three years ago; never reduced; now has necrosis of radius and humerus, the result of a recent injury. Dr. Ingalls removed the diseased bone July 31st, 1877. Well in eight months, and had a slight motion of the joint.

(4.) James, aged 9; received a compound comminuted fracture of right humerus into elbow-joint from falling downstairs; also a compound fracture of right ulna just above the wrist, and a fracture of right radius and ulna at the junction of middle and lower thirds. Dr. Cheever took away an inch and a half of the lower end of the humerus, and dressed the arm antiseptically. Free suppuration followed in spite of the Lister dressing, which was applied for two months; at this time the wounds were nearly healed, the arm was stiff, and fingers slightly movable.

(5.) Florence, aged 6, had necrosis of elbow, the result of breaking up an anchylosis, which was caused by a fracture of the lower end of the radius. The head of radius and ulna, and the lower end of humerus, were removed by Dr. Gay, October 25th, 1878. Wound irrigated with a carbolic-acid solution, and dressed with the Lister gauze. Some exfoliation of bone followed, but the wounds were healed in five months, and she bid fair to have a useful arm.

(6.) Benj. C., aged 28, was run over by a horse-car, and the lower end of humerus broken into the joint. Openings enlarged, and a fragment two inches in length was removed by Dr. Gay. Soft parts badly crushed; radius and ulna not meddled with. Dressed as above. Free suppuration followed, as well as some exfoliation. He was about well, in six weeks. Two years later the wounds were soundly healed, but the muscles of the arm were so wasted that the power of flexion was slight.

(7.) Wm. H., aged 38; idiopathic necrosis of right elbow for four months. Excision of humerus (one and a half inches) and radius and ulna, by Dr. Thorndike, December 6th, 1878. Discharged, about well, in six weeks.

(8.) Peter, 70 years old; necrosis from injury received two weeks ago. Dr. Thorndike performed excision of the elbow January 17th, 1879, and the patient was discharged, March 25th, nearly well. Passive motion was being used.

Only one patient died after this operation on the elbow. Most of them had fair limbs, with a good prospect of improvement from time and use. In two of the cases an endeavor was made to obtain a flail-motion of the joint by removing about two inches of the humerus, and all the radius and ulna which was possible without disturbing the attachment of the biceps. One case failed from the injury sustained by the muscles at the time of the accident; the other was fairly successful. None of the cases required a subsequent amputation. During treatment the arm was placed in a tin tray at an obtuse angle, which, as repair progressed, was reduced to a right angle in cases where anchylosis was expected.

Excision of the Shoulder. — David O'B., aged 28, had caries of the head of the humerus of three years' duration. Excised by Dr. Thorndike, February 22d, 1875. Bone softened, and gave evidence of fatty degeneration. After the lapse of two weeks the patient had several attacks of secondary hemorrhage, which finally resulted fatally in a week.

Excision of the Wrist. — Dr. Cheever advised amputation of the forearm in the case of an adult with caries of the wrist. He refused amputation, but consented to excision. Two vertical incisions were made, — one over the lower end of radius and second metacarpal bone, and the other over the ulna and fifth metacarpal. All the bones of the carpus, as well as the lower extremities of the radius and ulna, were diseased, and removed. The metacarpal bones were also affected, but were not removed. The operation was a thorough Lister,

the hemorrhage being controlled with the Esmarch bandage. Wounds healed in seven weeks, but the fingers were stiff, and the hand was almost useless.

Excision of Ankle. — A sailor, 20 years of age, fell from aloft seventy feet, and broke both bones of the left leg into ankle-joint. There is marked deformity and firm union, but the patient cannot stand on either foot. March 12th, 1875, Dr. Cheever excised the lower ends of tibia and fibula, and sawed off the articulating surface of the astragalus. The bones were removed through incisions over each malleolus. The large cavity was packed with an oiled bit of compress, filled with small sponges, and the foot and leg firmly bandaged to the knee. As was to be expected, free suppuration followed, but no serious complications. When he was discharged, at the end of eight weeks, the wounds were not healed, but the foot was so firmly attached that he could easily raise it from the bed. He subsequently recovered a fair limb.

Excision of Tarsus. —(1.) Julia, aged 5; caries for some years; sinus and suppuration. February 19th, 1875, Dr. Cheever removed the os calcis, cuboid, scaphoid, and the cuneiform bones. The wounds were healed in three months.

(2.) Charles, aged 13; caries of heel for two years; Dr. Cheever removed a portion of the os calcis by a crucial incision. Wounds closed in two months.

(3.) John, aged 2; caries ten months. Os calcis and scaphoid removed by Dr. Homans. Discharged, about well, in six months.

Œsophagotomy.

Mrs. M., 49 years of age, felt something lodge in her throat while eating fish on the afternoon of Friday, September 6th, 1878. Dr. Gay saw her on Saturday evening, about thirty hours after the accident. She could swallow only a few drops of liquid, and that with considerable difficulty. No solid food had been taken from the first. There were two sore points, — one near the cricoid cartilage, which had persisted from the time of the accident, and another behind

the centre of the sternum, which came on later, and gave the patient the impression that the offending substance had moved downwards. The temperature was normal. She was ordered to drink what iced milk she could, and an eighth of a grain of morphia was given subcutaneously.

The next morning the patient was worse. Her temperature was 100.5° F., and pulse one hundred. She had slept little, and was restless, anxious, and dejected. Deglutition was accomplished only after repeated and strenuous efforts. A careful trial was now made with sponge and bristle probangs to clear the œsophagus, but without success. The instruments increased the soreness at the points above mentioned, and on withdrawal were tinged with a little blood. Another injection of morphia was given.

As the symptoms continued to increase in severity, œsophagotomy was performed by Dr. Gay, Sunday afternoon, forty-eight hours after the accident occurred. An incision three inches in length was made on the left side of the neck, commencing at a point midway between the median line and the anterior border of the sterno-mastoid muscle, and extending toward the sternum. The skin, fat, and deep fascia having been divided, the sterno-mastoid was exposed. The sterno-thyroid and sterno-hyoid were then raised and drawn inwards, together with the upper portion of the omo-hyoid. The sheath containing the large vessels was drawn outwards, and protected with a wide retractor. By means of the finger and director the dissection was continued down to the prevertebral muscles. At the bottom of this deep wound a sharp substance was at once detected, pricking through the walls of the œsophagus. It was seized with dressing forceps, and by careful manipulations made to cut its own way out, pus flowing by its side. The foreign body was a thin, flat fish-bone, with sharp borders and pointed extremities, an inch and a quarter in length, and a third of an inch wide. It was imbedded in the posterior wall of the gullet opposite the cricoid cartilage, the seat of the greatest pain and tenderness. There was no hemorrhage of importance, and no ligatures were required. The external wound was closed throughout its whole extent with silk sutures; the œsophageal

wound being allowed to take care of itself. Simple dressings only were used.

From the time of the operation on Sunday, until Thursday, the patient was not allowed to swallow anything whatever. An enema, composed of about four ounces of beef tea, with a little brandy and a few drops of laudanum, was administered every four hours. On the fourth day she was allowed to drink freely, and, although at that time there was some suppuration, yet not a drop of food ever appeared in the wound.

Ten days after the operation the wound was healed; a few days later she was up and about the ward, able to eat eggs, oysters, and all sorts of soft food. She left the hospital September 26th. The wound was soundly closed, the neck free from swelling and soreness, and the voice natural. She was well.

Although the bone had been in the œsophagus only forty-eight hours, yet the suffering was great, and pus had already formed. There was also considerable fulness at the lower part of the neck, which made its appearance only a few hours previous to the operation. The advantage of an early operation is well shown by the rapidity of recovery; comparatively little harm had been done locally, and the system had not become greatly enfeebled by long-continued irritation, and deprivation of food. Dr. Cheever's earliest operation was performed about seventy hours after the accident, but no pus was found. So far as we know, œsophagotomy has never before been done earlier than the third day. The wound in the above case was closed with sutures throughout its entire length, to hasten its healing, and thereby avoid a fistula, which is sometimes very obstinate. We had little to fear from the opening in the œsophagus, on account of its small size and the absolute rest to be given the parts. With the exception of a small spot in the centre, from which there was a moderate discharge for a few days, the wound healed by first intention. Usually, in œsophagotomy, liquid food escapes from the wound for about three weeks, and six weeks or more elapse before recovery is complete.

A short time after the above operation we saw, in consultation, a boy $3\frac{1}{2}$ years old, who had swallowed a twenty-five-cent-piece five weeks previously, while lying on the floor upon his back. The child had more or less difficulty in swallowing solid food, and for days at a time could take only liquids; had no dyspnœa, but hoarseness set in early, and persisted throughout. The family physician, Dr. Robinson, of Southboro', passed a probang, and examined the throat at the time of the accident, but found nothing.

The child was etherized, and the œsophagus carefully examined with probangs without detecting anything.

In view of the history of the case, and the persistence of the dysphagia, we advised that, if the symptoms did not disappear after the irritation of this examination had subsided, the œsophagus should be opened and explored; because, if the coin was there, it could probably be found and removed, and at all events the risk of an operation would be no greater than the danger of ulceration and perforation.

No operation was performed, however, nor did the symptoms subside. At the end of five and one-half months, during a violent attack of vomiting, a leaden quarter of a dollar was ejected from the mouth in a blackened, but not eroded, condition. The symptoms soon subsided, and the child was as well as ever in a week.

The foreign body, which was almost an inch in diameter, was probably lodged in the lower portion of the œsophagus, this being the largest, most distensible, and least fixed portion of the tube; the child's inability to swallow solid food at times was undoubtedly due to the position of the foreign body. As regards the treatment of these cases we see no reason why the same rule should not obtain here as in cases of suspected foreign body in the air-passages: if the history is clear, and the symptoms persistent, operate. The danger of an operation cannot be greater than that of ulceration, perforation, abscess, and hemorrhage.

Tracheotomy.

We have twenty-one cases of tracheotomy to record, with the following results: eight for croup or diphtheria, all fatal;

four for a foreign body, two died; three for specific disease of the throat, relieved; one each for cut-throat, cancer of larynx, and œdema of the glottis from a burn, all resulting fatally; one for blood in the air-passages during an operation on the face, relieved; and two preparatory to removal of upper jaw, successful. We note a few of the more interesting cases: —

I.—Thomas, aged 18 months, had whooping-cough; trachea opened for a foreign body, and a match was found in the left bronchi, and removed, after being there six hours. Died from exhaustion in twenty-one hours.

II. — M. H., 3 years; suffering great dyspnœa for twenty-four hours; trachea and larynx laid open; a tin disc, one-half by three-fourths of an inch in diameter, removed; larynx closed with two wire sutures, and two silk sutures put in trachea; tube removed on the sixth day; discharged well in eighteen days; voice high and weak.

III. — Anna C., aged 7 years; great dyspnœa at times for six weeks. On opening trachea, a glass bead, the size of a pea, was coughed out. Wore a tube five days. Well in two weeks.

IV. — Jeremiah, aged 4 years; found nearly dead under a bed that was on fire. Dyspnœa gradually increased and became very severe; tracheotomy next day; relieved for twenty-four hours, then dyspnœa returned, and he died in two days. The autopsy revealed the larynx, trachea and bronchi lined with a firm, tough coating of mucus; and the mucous membrane was highly congested.

V. — Annie, 1 year old, swallowed a piece of egg-shell twenty-four hours before. Severe dyspnœa constant; tracheotomy; nothing found; died in thirty hours; no autopsy.

VI. — Johanna R., aged 80 years, cut her throat with a razor. Wound between the thyroid cartilage and hyoid bone, opening the œsophagus; vocal cords and epiglottis plainly

seen; hemorrhage free; tube put in trachea; eight ounces warm milk injected through the wound in the œsophagus into the stomach; died from exhaustion in four days.

VII. — S., aged 39 years, contracted syphilis seventeen years ago; ulceration of throat three years; pillars of fauces and soft palate so contracted that the opening is no larger than a common lead-pencil; epiglottis involved, and he can swallow only by holding his nose and forcing air up through the larynx to prevent the entrance of food to the air-passages; tracheotomy; stricture forcibly dilated with the finger with great relief. Discharged, in five weeks, wearing the tube. Able to eat solid food quite easily.

VIII. — John, aged 40; severe dyspnœa for several months, due to specific laryngitis. Cannot speak aloud, or sleep. Ether; tracheotomy; profuse hemorrhage, of bright red blood, occurred on opening the trachea. Incision extended upwards and a small sponge crowded into the larynx. Bleeding, which was thought to come from the mucous membrane of the trachea, soon ceased. Patient greatly relieved in his breathing. Wore tube two months; it was then omitted for a few days, and a smaller one introduced. Can talk quite well. Discharged, relieved, in four months, wearing the tube.

Out of twenty cases of tracheotomy for croup and diphtheria done in this hospital in fifteen years, only five have recovered; in twenty-two operations, for other reasons, not counting those made preparatory to removal of upper jaw, the mortality was thirty-six per cent.

No case of diphtheria, so far as we know, with marked enlargement of the cervical glands, and with a discharge from the nose, has ever recovered here, after the trachea has been opened. These cases die from an extension of the disease below the tube, or from blood-poisoning. Yet the rule here is to open the trachea, if the dyspnœa is severe, and the vital powers not too depressed. Life is often prolonged a few days thereby, suffering is relieved for the time,

and every chance for recovery is given the patient. In only one instance have we ever seen death hastened by the operation. A child was brought to the hospital in the last stage of diphtheria, suffering from great dyspnœa and exhaustion. A few whiffs of ether were given, and an incision made, but before the trachea was reached the patient died from shock and prostration, not from apnœa nor hemorrhage.

Steam is used in the after-treatment of these cases, but not as profusely as formerly, as too much moisture with the necessary heat was found to be too depressing. By connecting an ordinary atomizer with the steam-service of the hospital by means of a rubber tube, an excellent spray is obtained, which can be medicated in any way desirable, and thrown into or near the patient's face. The clothing is protected by rubber sheets.

Ether is usually, though not always, given in this operation. It not infrequently causes spasm of the glottis, obstructs the respiration, and interferes greatly with the operator's comfort. Chloroform is said to act better in this respect, but we have never known of its being used here.

Complete Fissure of the Lower Jaw; The Tip of the Tongue attached in Front of Hyoid Bone; Operation; Cure. — Miss X., aged 28, sought relief of Dr. Thorndike for a congenital fissure of the lower jaw, extending from the symphysis to the upper part of the neck in the median line. Neither the soft parts nor the two portions of the lower jaw had ever united, and whenever the patient opened her mouth the fragments of the inferior maxilla protruded laterally like horns, and presented a large cavity in place of the natural mouth. None of the hard or soft parts were wanting. The tip of the tongue was bound down to the tissues in front of the hyoid bone, thus allowing the saliva to dribble upon the chest.[1]

Dr. Thorndike closed the fissure by first dissecting up the tongue freely from its adhesions, and bringing it forward to its place in the mouth. The end of the fragments of the jaw

[1] V. Plate.

were then sawn off, and approximated at the symphysis by wire sutures. The soft parts on each side of the fissure, below the chin, were brought together, after the edges of the skin had been freshened, and secured with silk sutures. A new lower lip was formed by making free lateral incisions vertically, and sliding the skin forward on each side, and fastening the flaps at the median line with sutures. Finally the teeth of the upper jaw were extracted, as they were large and protruding.

The wound healed kindly by first intention, and the fissure was thereby closed throughout its whole extent. An upper set of false teeth was fitted in due time, and her appearance was greatly improved.

Rhinoplasty. — Elizabeth F., widow, aged 54 years; had lost all of her nose below the bridge, except the tip of the columna, by an ulcerative disease of eight years' duration. There was a clear history of syphilis, but no other signs of the disease were present. The ulceration had ceased.

The patient being etherized, the tip of the columna was freshened, and a deep groove made on each side of the nares to receive the new nose. A flap three inches long by two in width was taken from the forehead, twisted to her left, and fastened in its place by silk sutures, one passing through the tip of the columna. The new nose stood up well, as the flap was thick and large. The edges were cut on a bevel, and fitted into the grooves without difficulty. Pieces of a large elastic catheter were inserted into the nostrils, the nose covered with dry cotton, and the wound on the forehead dressed with carbolized oil. Operation by Dr. Gay.

The sutures were removed in ten days, and the union was good. She could breathe through the right nostril at the end of a month.

Having a low forehead, the flap extended on to the scalp about half an inch. It is said that the hair follicles, in these cases of transplanting from the scalp, shrivel, so that eventually the hair ceases to grow on the new nose. At the end of six months, in the above case, the growth of hair had diminished one-half, and bid fair to disappear altogether. The

Fissure of Lower Jaw,
before operation.

Same Patient, after
operation.

Dr. THONDIKE'S Case.

HELIOTYPE PRINTING CO., BOSTON.

nose had shrunken somewhat, but her appearance was greatly improved. The pedicle of the flap was never divided, as she refused to have it done, saying she was perfectly satisfied with it as it was. However, it became so small, and lay down so flat, that it looked about as well, as it would, had it been divided in the usual manner.

Compound Comminuted Fracture of both Femurs; Recovery. — Mr. C., aged 31 years, a printer, was run over by a horse-car, and received a compound and comminuted fracture of each femur, at the junction of the middle and lower thirds. There were two small openings in each leg at the seat of fracture, leading down to the bone. Both limbs were placed in long fracture-boxes by Dr. Gay, packed in oakum, and the wounds dressed with carbolized oil. The patient suffered severely from shock, which was followed by high fever, delirium, and great prostration. These symptoms gradually subsided. The legs were placed upon ham splints, and light extension applied.

In four and a half months the wounds were healed, and union was firm in both fractures; there was slight motion in the knee-joints. He began to walk a little in seven months, and in a year and a half he got about with two canes pretty well, and was at work again at his former business.

Extroversion of the Bladder; Operation; Partial Relief. — Stephen B., aged 6 months, had an opening above the pubes, about an inch in diameter, leading into the bladder, the mucous membrane of which protruded when the child cried. The skin of the abdomen was continuous with the lining of the bladder. Penis normal, and catheter comes out at the opening.

Longitudinal flaps, about an inch in length, were made by Dr. Cheever, on each side of the aperture, and brought together in the median line by five silver sutures. Union was obtained in the upper portion of the wound, but the urine escaped below, and the child was removed from the hospital before any further efforts could be made to close the opening.

Excision of Nerves for the Relief of Neuralgia. — A woman, aged 42, had suffered from facial neuralgia fifteen years. A portion of the alveolar process had been removed four years ago without benefit. The lower jaw was trephined and half an inch of the inferior dental nerve removed. She left the hospital in a fortnight, free from pain.

Mr. D., aged 60; severe neuralgia for thirty years. A portion of inferior dental nerve had been excised three years previous to entering the hospital, with temporary relief. One-third of an inch of the nerve was removed by trephining the body of the lower jaw. Pain had not returned at the end of two weeks.

In a case of severe neuralgia of the side of the head, of five years' duration, three-fourths of an inch of the anterior temporal nerve was removed, with temporary relief.

AN ANALYSIS OF TWO HUNDRED CASES OF PRIMARY PLEURISY.

By A. L. Mason, M.D.

This series includes all cases of idiopathic pleurisy which have entered the hospital during the past ten years. As they were under the care of the different physicians of the hospital staff in turn, this analysis is presented more with a view to the general statistics and results than to individual modes of treatment. The practice of the hospital with regard to most very large effusions, however, is uniform; namely, to tap early.

The many other cases in which pleurisy coexisted with, or was evidently secondary to, pneumonia, phthisis, and other forms of organic disease, have not been counted, except in a few instances; nor have those of empyema, seventy in number, as that form of pleurisy, which was the subject of a paper by Dr. John G. Blake in the last volume of these reports, requires separate consideration, and is beyond the scope of this analysis. Six cases, in which serous effusions became purulent after tapping, have, however, been entered in a table, and will be referred to later. A few of the cases of primary pleurisy were also included in Dr. Hall Curtis's paper on Pleurisy and Thoracentesis, in the previous volume.

I wish to acknowledge the valuable assistance of Dr. C. G. Weston, house physician, in preparing the following tables from the mass of hospital records. Table I. contains sixty-four cases in which the chest was tapped once or oftener; Table II., six cases in which effusions, apparently serous, became purulent after tapping; Table III., one hundred and thirty-two cases in which effusions were absorbed without tapping. A few cases of dry pleurisy are included.

The exigencies of a large hospital for acute diseases require the early dismissal of all patients who can go out with safety, and many of those with pleurisy ask for their discharge before complete reabsorption has taken place. In all such instances the term "relieved" is used, but there is no reason for doubting that in most cases recovery ensued.

In the subsequent analysis the following points will be considered: 1. The relations of season, sex, age, and occupation to the number of cases. 2. Causation. 3. Localization; physical signs and symptoms; amount of effusion. 4. General and local treatment; absorption. 5. Thoracentesis; its relation to the number of cases, extent of effusion, age, and duration. 6. Empyema after tapping. 7. Mortality; report of four fatal cases. 8. A case of cancer, and one of tuberculosis of the lung and pleura, with autopsies; a case of pyo-pneumothorax, with recovery after aspiration.

General Considerations.

Season. — It appears from the record of admissions that sixty-six cases entered in the spring months, fifty-four in summer, and forty each in the autumn and winter, — a considerable preponderance for the spring over all other seasons, and for the warmer half of the year over the colder. The number of admissions in August was greater than in any other month, except in May, without apparent reason, unless in midsummer the exposure from sleeping out-of-doors can be regarded as tending to determine an attack of pleurisy. The data are appended: —

January,	18 cases.	August,	23 cases.
February,	11 "	September,	15 "
March,	21 "	October,	11 "
April,	22 "	November,	14 "
May,	23 "	December,	11 "
June,	12 "		
July,	19 "	Total,	200

Sex; Age. — The proportion of males to females was three to one. Although no children under ten years of age appear in the list, it must not be inferred that pleurisy is an

extremely rare disease in childhood; but it occurs more especially in the suppurative form, as a sequel to acute diseases. In our series the ages were as follows: —

11 years,	1	From 20 to 30,	81
13 "	1	" 30 " 40,	58
15 "	1	" 40 " 50,	35
16 "	2	" 50 " 60,	7
17 "	1	" 60 " 70,	6
18 "	4	70 years,	1
19 "	4		—
	—		Total, 188
Total under 20,	14		

From this we conclude that two-thirds of the subjects of pleurisy are between twenty and forty, and that it is not often seen in the aged.

Ætiology. — The causes of pleurisy are obscure, except when it is a complication or sequel of certain acute and chronic diseases. Cases of the latter type were excluded from our list, as being secondary; but of the other class a few instances are recorded. Exposure to cold and wet, especially when coincident with drunkenness, has been regarded as a frequent exciting cause; and those conditions, singly or combined, were present in about quarter of our cases, but still, more than half remain without any assignable cause beyond the individual susceptibility to this particular form of localized inflammation, — a tendency which the number of unexpected pleural adhesions found after death proves to be not uncommon.

The following list contains all the cases in which the ætiology could be surmised: —

Drink	6	Previous pleurisy	7
Exposure	45	Doubtful phthisis	2
Injuries	5	Rheumatic fever	5
	—56	Rheumatism (sub-acute and muscular)	1
After abortion	1	After typhoid fever	1
" chronic diarrhœa	1	" small-pox	1
" intermittent fever	3	Syphilis	2
" acute nephritis	2		—
" measles	1	Total	88
" pneumonia	5		

Occupations. — The diverse employments are indicated in the following table; laborers and servant-girls predominate, the two classes especially subject to deteriorating influences, and always largely represented in hospital wards: —

Actor	1	Hostler	1	Printers	2
Baggage master	1	Housewives	8	Rope-maker	1
Barber	1	Laborers	46	Sail-makers	2
Bar-tenders	3	Longshoremen	4	Sailors	6
Blacksmiths	6	Machinist	1	Salesman	1
Cabinet-maker	1	Masons	4	Shoemakers	7
Carpenters	6	Mechanics	10	Shop-keeper	1
Coopers	2	Nurses	2	Stone-cutters	4
Curriers	2	Painters	4	Students	2
Domestics	40	Peddlers	3	Tailor	1
Farmer	1	Piano-tuner	1	Tailoress	1
Firemen	2	Pilot	1	Teamsters	5
Florist	1	Plasterers	2		
Hatter	1	Porters	2		

Localization. — The right side was the seat of the disease in ninety-nine cases, the left in one hundred, — a remarkably equal division, which is somewhat varied in those cases which required tapping, forty being on the left and thirty on the right. In two instances there was double effusion of moderate volume, — a rare condition idiopathically.

Quantity of Effusion. — For the sake of comparison, the cases which required thoracentesis [correctly speaking, *thoraco-centesis*], and those which did not, are divided into four classes, viz.: 1. Those in which the effusion reached the clavicle. 2. Those in which it extended as high as, or higher than, the third rib, but did not reach the clavicle. 3. Those in which the level of the fluid was below the third rib. 4. Cases of dry pleurisy.

1. Under the first heading were thirty-two cases, twenty-four of which required thoracentesis, while in the remaining eight reabsorption took place without interference. Those which were tapped remained in the hospital, on the average, thirty-nine days; those which were not, forty-one days. If, however, four cases, which were retarded by unusual complications, are excluded from the former category, the average stay in hospital is reduced to thirty-four days.

2. There were forty-four cases in which the effusion extended as high as, or higher than, the third rib, but did not reach the clavicle. Seventeen of these were tapped; twenty-seven were not; they remained in the hospital, on the average, thirty-five and thirty-four days respectively. Again, if a single case, which required four tappings and made a slow recovery in one hundred and seventeen days, is excluded from the former category, the average stay in hospital of the other sixteen patients who were tapped is five days less, that is, but thirty days.

3. In one hundred cases the level of the fluid did not reach the third rib. Eighteen of these were aspirated, and the rest were not; the average length of time in hospital being twenty-seven days for each class.

4. Fourteen cases of dry pleurisy, regarded as idiopathic, were discharged "well" in most instances, after an average period of twenty-six days.

Taking the whole series of cases the average length of time under hospital care was thirty days; but the result of inquiry at the time of entrance was to show that the average duration of previous disability had been nearly three weeks. So we may infer that an uncomplicated attack of primary pleurisy with effusion is likely to cause an illness of two months.

These figures are given for what they are worth; not, however, with the intention of comparing the results of thoracentesis with those obtained by more expectant methods, because it is only in the cases of less severity that the latter are admissible, when the tolerance of the thoracic organs to the fluid encroachment and the indications of progressive absorption are apparent. Nor can we tell how long might have been the duration of the cases which found early relief in tapping, if this procedure had not been resorted to; or how many more fatal results we might have to record if more dilatory methods had been pursued.

Symptoms. — A glance at the tables will show the condition of many of the patients at the time of admission, with regard to the pulse, temperature, and breathing. The usual

pulse rate was about one hundred; in many cases, however, as high as one hundred and twenty, rarely reaching one hundred and forty, but in one instance rising to one hundred and fifty.

The character of the beat, especially if it is irregular, and combined with a feeble first sound as heard with the stethoscope, with pallor and signs of deficient aëration, is a better index than dyspnœa of dangerous embarrassment of the heart and lungs.

The temperature is rarely of great importance, and fever is seldom a prominent symptom. The thermometer occasionally indicates 102° or 103° F.; in one instance in our table it rose to 105.4° F.; but after the more acute stage the fever generally abates.

Rapid breathing is to be expected in cases where there is much pain or effusion, and severe paroxysms of dyspnœa may be excited by slight movements; but as the displacement of the thoracic organs and of the diaphragm comes about gradually, the apparent tolerance of large effusions with little discomfort or dyspnœa is not always a good criterion of the amount of damage or danger.

More or less pain and cough were present in most cases, often accompanied by headache and diarrhœa, sometimes by chills. In severe cases with large effusion and impeded circulation, pallor, with a cold, moist skin and scanty secretion of urine, was observed.

Physical Signs. — Bronchial breathing transmitted from the condensed lung throughout the affected side; obliteration or bulging of the lower intercostal spaces, with depression of the diaphragm and abdominal viscera, usually indicated by pain at the hypochondrium; great displacement of the heart or signs of undue pressure upon its walls; congestion of the opposite lung,— all these signs, and others of less importance, were recorded in many instances. Prompt withdrawal of the excess of fluid almost invariably gave relief.

In a certain number of cases of smaller effusions the upward turn of the fluid toward the axilla, the parabolic curve of Damoiseau, which was the subject of careful investigation

by Professor Calvin Ellis a few years ago, and by Dr. G. M. Garland, who found it to assume the shape of the letter S, — in a certain number of cases this peculiarity in the distribution of the fluid was observed. In other instances it was noted that the line of flatness was horizontal, and that the level of the fluid changed with the position of the patient; in other words, that the force of gravitation asserted itself.

With regard to mensuration a difference of from half an inch to two inches was recorded in many cases, in favor of the affected side. This enlargement is often more apparent than real, from the change in contour which an effusion may cause. But the right side is normally from a third of an inch to an inch and a half larger than the left, owing to greater muscular development. Occasionally both sides are equal; rarely the left is larger than the right, presumably in left-handed individuals. Therefore actual enlargement of the left side, as compared with the right, need be but slight when there is in reality considerable distention.

General and Local Treatment.

Strict confinement to bed, with shoulders raised if the breathing was impeded, and nutritious diet with opiates and stimulants when needed, in many cases gave all the assistance which nature required in promoting absorption. A certain restriction of the amount of fluid taken is desirable. Early and brief treatment by hydragogue cathartics, diuretics, and diaphoretics appeared to be of benefit in a considerable number of cases; but the use of depleting remedies requires caution. Under this head elaterium, calomel, and compound jalap powder; digitalis, the salts of potash, and jaborandi or pilocarpine, were the most useful. Iodide of potassium and preparations of iron, especially the tincture of the chloride, were extensively used as tonics and sorbefacients with good effect.

The external use of the tincture of iodine, mustard, leeches, small blisters often repeated, occasionally large blisters, stimulating liniments and soothing poultices, was quite general; but, in the opinion of the writer, such applications often increase the discomfort of the patient, and are followed by good

effects chiefly in those cases which would have done as well without them, or with simple heat, cold, or anodyne embrocations.

Appliances for restraining the movements of the thorax, if the tendency of the patient is to hold his sides whenever he moves or coughs, have often given great comparative comfort. For this purpose a swathe, or strips of adhesive plaster going round the chest, will do very well; but a Martin's India-rubber bandage, three or four inches wide, extending from the lower border of the ribs to the axilla, is more convenient, adapts itself better to the chest-walls, and supplies an easily regulated elastic pressure, which is also useful in promoting absorption after tapping. The same appliance has sometimes given relief in pneumonia, phthisis, bronchitis, and asthma.

Still, in spite of these measures, or on account of conditions which did not admit of delay, more than a third of our cases required tapping once or oftener; and to ascertain the result of these operations was the chief object in view in attempting this analysis.

Paracentesis Thoracis.

The operation of paracentesis thoracis was performed one hundred and twenty-two times, in seventy cases, with no unfavorable result which could be attributed to the operation in any instance, but usually with great and permanent relief. It was necessary to tap the chest twice in fourteen patients, three times in six, four times in seven, and six times in one individual, in whom, however, the fluid had become purulent. In the remaining forty-two cases one operation was sufficient. In fifty-eight cases the average length of time in hospital before paracentesis was but twenty-eight hours, as will be seen by consulting Table I. The operation was deferred for a number of days, which averaged twenty-five, in twelve patients whose symptoms were less urgent; and in those cases, twenty-eight in number, in which the fluid reaccumulated, it was withdrawn the second time, after an average period of ten days.

The quantity varied from a few ounces to eleven pints; but

a glance at the table will show that in many instances three quarts or more were removed without inconvenience.

In quality the fluid was usually translucent serum of varying shades of color, coagulable, and when examined under the microscope found to contain blood and pus in small quantities.

The seventh, eighth, or ninth intercostal space below the angle of the scapula was generally chosen for aspirating, but it was occasionally necessary to insert the needle at other points. The pneumatic aspirator was usually employed; but in some cases with considerable intra-thoracic pressure the fluid was allowed to drain off through an India-rubber tube into a vessel on the floor, the free end of the tube being under water to prevent the entrance of air. A slight cough is sufficient to start the flow. The removal of a small amount of fluid was often found to relieve the undue tension or pressure which appears to check absorption and paralyze the expansive force of the lung; indeed, it is doubtful whether it is ever best to withdraw it all at once, and the first sign of faintness, cough, or præcordial distress should be the signal for stopping the flow. These symptoms are apt to occur if the effusion is removed too quickly; therefore the smaller aspirating tubes are better than the large ones, and a small trocar and canula is preferable to the sharp pointed-needles which scratch the lung. For debilitated persons, or those who are extremely nervous, with palpitation or a tendency to syncope, the recumbent position was sometimes found desirable, and an ounce or two of whiskey during or after the operation was not amiss, though seldom essential.

With these precautions, and an occasional anodyne when there was subsequent cough or discomfort, no serious inconvenience which could be regarded as the effect of tapping resulted to any one of our seventy patients.

It seems trite and unnecessary to lay much stress upon these simple measures for the avoidance of what have been sometimes called the "dangers" of thoracentesis. The danger is not in the operation, but from the delay in performing it, or from some coincident malady on the part of the patient.

No deductions of value can be made from our tables as to the influence of age upon the rapidity of pleural absorption, as some of the juvenile cases were a long time getting well, and of eight cases between sixty and seventy years of age four quickly recovered, three died, and one went away, after a few days' treatment, without improvement. It may be stated, however, that the greater rigidity of the chest walls in elderly persons causes less tolerance of the fluid within, which therefore should be promptly evacuated.

Empyema after Tapping.

In six cases entered in Table II., effusions which were serous at the earlier tappings later became purulent and required incision and drainage. There is no way of accounting for this change in the character of the secretion, but it is probable that microscopic examination of the fluid would have shown an unusual number of pus corpuscles at the outset. In several of these cases the pleurisy appears to have been secondary to chronic affections.

In one patient, who had nearly recovered, washing out a small pus cavity caused attacks of fainting on two occasions, although the same procedure had not given trouble before. These seizures, usually epileptiform in character, are reported often enough in medical literature to make especial care necessary in washing out the pleura. The exact physiological cause is obscure; but the shock of too forcible, too irritating, or too cold an injection into the cavity appears in many instances to have produced syncope, alarming convulsion, and sometimes death. Similar phenomena have also followed the injection of the bladder, the uterus, and even the passing of a catheter. The composition of the cleansing solution seems to have less to do with these accidents than the manner in which it is employed, for weak washes of carbolic acid, Lugol's solution, permanganate of potash, and even warm water, have alike been followed by the same dangerous symptoms. Sudden irritation of the sympathetic through the great splanchnic nerve, with anæmia of the brain, has been held accountable for such attacks; but in some cases there has been paralysis of limbs after the convulsions,

which gives color to the theory of an embolic origin; and the possibility of direct shock to the heart may be entertained, as well as the coincidence of a true epileptic fit. The use of a double irrigating tube obviates the danger of distention.

RESULTS.

Of 195 cases included in Tables I. and III.,

96	were discharged	. . .	"well."
6	" "	. . .	"nearly well."
18	" "	. . .	"much relieved."
69	" "	. . .	"relieved."
2	" "	. . .	"not relieved."
4	" "	. . .	"dead."
Total, 195			

As was before stated, early dismissal as "relieved," after an affection like simple pleurisy, implies in most instances convalescence. Of the two cases "not relieved" one was complicated with nephritis, and the other was that of a man, aged sixty, with a considerable effusion, who stayed but a few days in the hospital.

Mortality. — There were four fatal cases, Nos. 44, 59, 60, and 61, in Table I. No. 38 was not a case of primary pleurisy, as the autopsy showed. In the other four, unfortunately, no post-mortem examinations were obtained, but the histories are given below. One was 60 and two were 65 years old, and it is not improbable that the fatal results were due to other causes beside pleurisy.

CASE 44. *Right-sided Pleurisy; Thoracentesis; Death three days after.* — A negro from North Carolina, age 36, entered May 10th, 1873. Family history and general health poor. Four weeks before, after getting wet through, he had chills, alternating with fever, for several days; at the same time symptoms of pleurisy in the right side. At entrance, pulse, 104, temperature, 101.8°, respiration, 32.

May 11th. He could not lie on his left side, which was hyper-resonant with supplementary breathing. Perfect flatness and absence of respiration on right side below the angle of scapula behind, and first rib in front. Intercostal bulging. Cardiac sounds loud, otherwise normal.

May 12th. Paracentesis; twenty-four ounces red serum; small blood-clot on standing; under microscope, blood, pus, and granular matter.

May 15th. The patient, who had been comfortable, grew rapidly worse in the night. Pulse, one hundred forty-five, respiration, thirty-two, as before. Heart sounds very loud. Free stimulation; no response; gradual failure; death. No autopsy.

Dr. Bowditch regards a bloody fluid at the first tapping as indicative of cancer. In this connection the following case is inserted for comparison: —

Cancer of Left Lung and Pleura; Secondary Pleurisy; Paracentesis; Death; Autopsy. — D. McC., male, aged 36, entered the hospital October 18th, 1880. Good family history and good health until six weeks before, when he gave up work on account of cough, pain in the left side, weakness, and anorexia. There had been slight cough, hoarseness, and expectoration, for six months. No hæmoptysis. At the time of entrance there was little pain, but dyspnœa on slight exertion; no appetite; nausea after coughing.

The left chest measured an inch and a half more than the right; the heart was beating at the median line, and there was a large effusion in the left pleural sac.

October 29th. Twenty-eight ounces of clear, dark-reddish fluid were evacuated with the aspirator, without much change in the physical signs. A few days later there was hæmoptysis, which recurred several times. The patient failed rapidly, suffered much from pain and dyspnœa; was aspirated again November 6th, and died the same evening, after an illness of about sixty days, dating from the time when he gave up his work, — that of a laborer in the gas-house.

Autopsy, ten hours after death.

Thorax. The diaphragm on the left side was at the level of the seventh rib. The left pleural cavity was so much distended that the fluid spurted out on dividing the cartilages. The measured amount of fluid was ninety-eight ounces, containing some pus. Both visceral and peripheral pleural surfaces were covered with fibrin, and on the former surface, especially, were numerous hard, cancerous nodules, from the size of a pea to that of a strawberry.

Left lung adherent at apex; pleura much thickened. Upper lobe dense, nodulated. On section limited areas of inflammatory product were seen throughout the lobe. On pressure a milky fluid exuded from the cut surface of the thickened pleura. Cancerous infiltration of connective tissue.

Right lung and heart normal. On the anterior surface of the liver, adjacent to the gall-bladder, was a hard, white, dense, cancerous growth, the size of a peach; another smaller nodule was observed. Spleen and kidneys normal. Other organs not examined.

Diagnosis: Cancer of lung and pleura, with secondary nodules in the liver.

Case 59. *Right-sided Pleurisy, with Effusion; Paracentesis; Death.*— E. G., female, aged 60, was admitted July 25th, 1879. For five months she had had a severe paroxysmal cough, dyspnœa, and vague pains in the chest. Rheumatism during the previous winter.

At the time of entrance she complained of pain in the right shoulder, and under the sternum after deep inspiration, which caused a fit of coughing. There was also a great deal of palpitation and pain in the cardiac region. No appetite; bowels costive; tongue moist, with a brownish coat. There was moderate dyspnœa with the signs of effusion filling half of the right pleural cavity.

July 28th. The effusion had increased slightly, and the breathing was bronchial in the upper part of the right chest. The dyspnœa and pain continued.

July 31st. The level of fluid was lowering, but dyspnœa was marked, and on the following morning there was a sudden aggravation of symptoms, the breathing becoming very rapid and shallow, the pulse rising to one hundred and twenty-eight, with general collapse. Paracentesis was immediately performed, and four pints of serum were withdrawn by the aspirator. There was slight relief to the urgent symptoms, but, in spite of the most active efforts to revive the patient, she died an hour later.

There was no autopsy.

Case 60. *Right-sided Pleurisy, with Effusion; Parcentesis; Death after four days.*— P. D., aged 65, laborer, entered May 11th, 1875. He stated that he had had a cough for a year and a half, at times quite severe, with loss of flesh and strength. Had been much worse for four weeks, with pain and dyspnœa.

May 13th. A pint of clear yellow serum was removed from the right pleural cavity, and on the following day it was noticed that there was deficient resonance in the right back, with feeble breathing of a bronchial character over the lower third, where the *vocal resonance was much intensified.* The sputa were thick and greenish.

The patient's strength failed, and he died four days later. There was no autopsy.

Case 61. *Left-sided Pleurisy; Paracentesis; Death a week after.*— J. C., laborer, aged 65, entered April 18th, 1876, after an illness of three months, during which he had had constant pain in the left side, extending downward and ontward from the left nipple. For a month before there had been cough, anorexia, constipation, and increasing weakness, without much dyspnœa. At entrance the pulse was 92, temperature 101.5°, respiration 24.

Physical examination showed effusion in the lower half of the left

chest, for which the patient was tapped two days later, and twenty and a half ounces of clear, coagulable serum were withdrawn by the aspirator. It had previously been noted that the heart sounds were *distant and irregular*.

Much pain in the left side followed, the weakness and cough increased, with dyspnœa and lividity, and six days later the patient died from exhaustion. Before death, for several days, the respiration varied between twenty-eight and thirty-six, the temperature remaining as at entrance, and the pulse rising to one hundred and forty. There was no autopsy.

Case (not in the table). — *Left-sided Pleurisy, with effusion; Death; Autopsy.* — A man, age unknown, entered the hospital, moribund, Nov. 2d, 1880, and died before an examination could be made.

The previous history was not ascertained, but the post-mortem examination showed pleurisy of the left side, which contained fifty-two ounces of serum. There were also ten ounces in the right pleural sac, and twelve ounces within the pericardium. There was dilation of the right side of the heart, but no valvular lesion. The stomach and spleen were engorged, and there was fatty infiltration of the liver.

The following case of pyo-pneumothorax, not in the table, is inserted for comparison with Case 21, Table I. : —

Case. *Pyo-pneumothorax; Recovering after three Aspirations.* — J. E., aged 64, who belonged to a phthisical family, entered May 5th, 1875. He had been there four years before for ulcers of both legs, and a year later for paralysis of the left side, recovering from both affections under the free use of iodide of potassium. He had also suffered from severe headache. There had been more or less pain in the side, dyspnœa for six months before entrance, and for the previous week he had been unable to lie down. Cough was urgent, with abundant sonorous and mucous râles in both sides of the chest and very profuse purulent expectoration.

Physical examination showed the presence of air and fluid in the left chest, and four ounces of pus were withdrawn by the aspirator. At each expiration air spattered out into the bottle. The pus removed was of the same appearance as that which was expectorated.

Five days afterwards six ounces of pus were withdrawn, and sixteen days later six ounces more, the expectoration still continuing to be very profuse and of the same character.

June 3d. It was noted that the patient's symptoms were much relieved, and that he could lie down. In the meantime he had been taking considerable doses of iodide of potassium, and July 7th he was discharged "well;" respiration with sonorous râles being heard to the base of the left lung where it had been very distant at entrance. Some dulness remained.

Remarks. — The specific history of this case and the favorable effects of anti-syphilitic treatment point to the probability of gummy tumor of the lung, with perforation of the pleura and circumscribed empyema, which was evacuated through the bronchi as well as by the aspirator.

Case 38. *General Tuberculosis; Pleural Effusion; Paracentesis three times; Death; Autopsy.* — D. O'N., laborer, aged 37, entered the hospital Jan. 19th, 1876. His family history was good, and he had never had a serious illness. Two months before admission he was attacked suddenly with pain under left nipple, cough, and dyspnœa; but he had not been confined to his bed and had worked until two weeks before admission. He could not lie comfortably on the left side. The body was well nourished, the appetite good, and the tongue moist and clean; but he slept poorly, and the pulse was one hundred and four, with a temperature of 102.8°. There were night-sweats.

Physical examination showed that the intercostal spaces were fuller on the left than on the right side. Vocal fremitus was absent on the left, where there was flatness on percussion below the fourth rib in front, in the infra-axillary region, and below the scapula behind, with very faint respiration. A few mucous râles were heard above.

February 1st. No absorption of fluid. Pulse has ranged from one hundred to one hundred and twenty; temperature from one hundred and one to one hundred and four degrees. Fifty-seven ounces of clear yellow serum were removed by the aspirator, with relief to the breathing, which, however, continued to be rapid, varying between twenty-five and thirty-seven. The cough remained the same, with muco-purulent sputa, and night-sweats.

February 13th. Continued night-sweats. Besides the signs of effusion in the left chest, previously mentioned, there was dulness at the apex, with bronchial breathing, bronchophony, and coarse mucous râles.

March 21st. The aspirating needle was inserted below the left scapula and in the infra-axillary region, but no fluid was drawn, and on May 2d it was noted that there was contraction of the left side of the chest, which measured two and a half centimeters less than the right, with dulness, deficient respiration, and râles throughout. The sputa were bloody. There was a systolic murmur at the base of the heart.

May 14th. Six ounces of clear yellow serum were withdrawn from the left side by the aspirator, and ten days later five ounces more, but on May 28th the patient was seized with sudden pain near the right nipple. Both sides of the chest were found to be filled with coarse and fine râles, and the sputa were bloody. There was free perspiration, with dyspnœa, cyanosis, and collapse, and the patient died on May 30th, after an illness of six months.

Autopsy. — At the autopsy it was found that the heart was large and pale. The left lung was thoroughly adherent to the pleura with tough membranes, and there were sixteen ounces of clear serum in the pleural avity. Both lungs contained small, irregular cavities at the apicesc

filled with caseous contents. They were also œdematous, and studded with minute white tubercles, as were the kidneys and liver.

Remarks. — Tuberculosis of the pleura is usually bilateral, and the fluid is sometimes bloody. It was not so in this instance. The immediate cause of death, sudden œdema, did not develop until four days after the last tapping.

In analyzing these fatal cases, in which from the failure to obtain autopsies no positive diagnosis except pleurisy could be recorded, it may be said, in view of the infrequency of deaths from simple pleurisy and the age of three of the patients, that in some of them at least other organic lesions were probably present. None had that sudden termination which is usually characteristic of death from pleurisy in the cases from time to time reported in medical journals.

The history of such cases is almost invariably that a patient with more or less fluid in the chest, after sitting up suddenly in bed, or going to stool, sometimes during the operation of tapping or soon after, without warning falls into a swoon, becomes cyanotic, and expires. Occasionally intense pulmonary œdema, with rapid asphyxia, overwhelms him; or hemiplegia and coma may carry him off. At the autopsy a firm clot may be found in the right side of the displaced heart, which is perhaps fatty, or the great veins may be occluded. Not infrequently there is embolism of the pulmonary artery; or, after long compression of the lung, thrombosis of the pulmonary veins may reveal the source of the plugs which have been carried through the general circulation to the brain or other organs. But a certain number of these sudden deaths have no satisfactory pathological explanation.

Left-sided pleural effusion has been regarded as more dangerous to life when the heart is greatly displaced than a similar collection of fluid in the right cavity. Prof. Otto Leichtenstern's article on "Cases of Sudden Death from Pleuritic Exudations," in the *Deutsches Archiv für Klinische Medicin*, for May, 1880, gives a comprehensive and interesting review of fifty-two such cases, from those reported by Trousseau down, showing that in thirty-one instances the *right* side was the seat of the effusion. He also devised experiments to prove that the venous circulation through the thorax and right side

of the heart was more compromised by the pressure of a large exudation in the right pleura than by the greater cardiac displacement incident to left-sided effusion. Several other questions were ably discussed and elucidated by Prof. Leichtenstern.

Conclusion.

This analysis presents few points from which new deductions can be drawn, as it simply reflects the mode of practice which has long prevailed in this vicinity, through the early example of Dr. Bowditch, whose frequent communications on the treatment of pleurisy have covered the whole ground. The wisdom of the principles which should govern the operation of paracentesis thoracis, as established by Dr. Bowditch many years ago, has met with universal assent; but still the general practice appears to have been rather conservative, especially in foreign countries. Therefore it is hoped that the presentation of a considerable number of cases without accident may offset the few recorded casualties to which of late attention has been drawn.

To repeat, Table I. contains all cases of primary pleurisy admitted to the hospital in which tapping was resorted to; Table II., six cases in which serous effusing became purulent after tapping; Table III., one hundred and thirty-two cases in which reabsorption took place without tapping. All recorded cases of intercurrent or secondary pleurisy in *non-organic* diseases are included, and a few cases of doubtful origin. It may be added that in the many cases of phthisis and hydrothorax which have been palliated by tapping, no instance of serious inconvenience to the patient, still less of danger, has occurred, as the result of removing the fluid.

Table I. 64 Cases in which

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
1	F.	16	Right.	2 months.	To clavicle.		I. 1 day. II. 36 days.
2	F.	18	Right.	4 weeks.	To spine of scapula.		15 days.
3	F.	18	Right.	11 days.	4th rib.		3 days.
4	M.	19	Left.	3 months.	Clavicle.	Below the right nipple.	I. 4 days. II. 11 days.
5	M.	20	Left.	8 days.	Clavicle.	1 in. to right of sternum.	I. 1st day. II. 11 days.
6	M.	21	Left.	1 month.	Clavicle.	Under sternum.	2 days.
7	M.	21	Left.	2 months.	Lower third.		6 days.
8	F.	21	Right.	3 weeks.	Clavicle.		3 days.
9	M.	21	Left.	2 weeks.	2d rib.	Right of sternum.	1 day.
10	M.	22	Right.	1 week.	Clavicle.		2 days.
11	M.	22	Right.	5 days.	4th rib.	Below left nipple.	1 day.
12	M.	22	Right.	4 weeks.	2d rib.	2 inches below left nipple.	3 days. 7th space, axillary line.
13	M.	24	Left. 1 in. larger than right. After 3d tapping but $\frac{1}{4}$ in. larger.	1 year.	Clavicle.	Outside of right nipple. 1st tapping at right edge of sternum. 2d tapping at left edge.	I. 1 day. II. 4 days. III. 9 days. IV. 28 days.

Thoracentesis was performed; 100 operations.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
168 oz. serum. 16 " "	6 weeks.	Not relieved.	At entrance: P. 140; T. 99° F.; Resp. 28. Renal symptoms. Patient discharged at her own request, against advice.
6 oz. coagulable serum.	27 days.	Well.	P. 110; T. 101°; Resp. 26. Steady absorption after removal of small quantity of fluid.
38 oz. serum.	4 days.	Relieved.	P. 98; T. 98°; at entrance. Discharged at request.
7 pints serum. 6 " "	5 weeks.	Much relieved.	P. 80; T. 98.6°. Chest strapped. No reaccumulation.
143 oz. serum. 39 " "	5 weeks.	Relieved.	At entrance: P. 100; T. 102°. Diarrhœa.
3½ pints coagulable serum.	5 weeks.	Well.	Local applications. Bronchial breathing, at entrance, throughout left chest.
30 oz. reddish serum.	7 weeks.	Well.	Iodide potassium. Blisters.
1 oz. only of serum. Failure of aspirator.	4 weeks.	Well.	Rapid absorption after withdrawal of a little fluid. At entrance, no dyspnœa. Ægophony.
6½ pints coagulable serum.	25 days.	Well.	P. 100; T. 102°; Resp. 38, at entrance. Diuretics.
6⅔ pints coagulable serum.	4 weeks.	Relieved.	P. 96; T. 100.6°; Resp. 28. Bronchial breathing throughout right side, at entrance.
1 pint serum, tinged with blood.	3 weeks.	Relieved.	At entrance: P. 120; T. 103°; Resp. 32. Patient was subject to intermittent fever. Level of fluid, horizontal, and changing by leaning forward.
42 oz. clear, yellow serum.	18 days.	Relieved.	Discharged at his own request.
4 pints sero-purulent fluid. 4 pints same. 2 " " 1 drachm.	4 weeks.	Well.	At entrance: P. 101; T. 101°. Patient stated that cardiac pulsation apparent at the right nipple had been so more than a year. Systolic murmur present disappeared after first tapping, when the flow of fluid was stopped on account of dyspnœa.

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
14	M.	25	Left.	2 weeks.	2d rib.	Right edge of sternum.	I. 2 days. II. 16 days.
15	F.	26	Left.	2 weeks.	3d rib.	1 inch right of sternum.	I. 1 day. II. 3 days.
16	M.	26	Left. Intercostal bulging.	3 weeks.	3d rib and spine of scapula.	Under sternum.	22 days.
17	M.	26	Left. ½ in. larger than right.	2 weeks.	2d rib.	6th costal cartilage, at right of sternum.	5 days.
18	M.	27	Right.	2 weeks.	Clavicle.	6th intercostal space, 2 inches to left, and 3½ below left nipple.	1 day.
19	M.	27	Left.	2 weeks.	Clavicle.	1½ inches right of sternum.	I. Immediately. II. 14 days. III. 28 days. IV. 33 days.
20	M.	27	Right.	3 weeks.	3d rib.		I. Immediately. II. 7 days. III. 14 days. IV. 21 days.
21	M.	28	Left.	3 weeks.	4th rib.	Right of sternum.	I. 18 days. II. 32 days.
22	F.	28	Right.	2 weeks.	2d rib.		10 days.
23	F.	28	Left.	6 days.	Clavicle.	Just above epigastrium.	3 days.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
2½ pints serum. 2 " " clear yellow.	7 weeks.	Well.	
4 oz. serum. 4 " " clear yellow.	2 weeks.	Relieved.	At entrance: P. 120; T. 101.2°. Discharged at her own request, against advice.
5 pints serum.	24 days.	Well.	P. 92; T. 100°; Resp. 20, at entrance. Rapid return of lung to normal condition after thoracentesis.
3 pints serum.	56 days.	Well.	P. 100; T. 102°; Resp. 27.
4 pints serum.	4 weeks.	Well.	P. 90; T. 102°. Bronchial breathing and bronchophony throughout right chest. Very severe cough, requiring opiates after tapping. Patient out of doors in twelve days.
5¾ pints. 3½ " Dry. Canula plugged. 8 oz. clear serum.	10 weeks.	Relieved.	Resp. 32, at entrance; fell to 22 after tapping; P. 84 to 70; heart returned 3 inches. Some distress at præcordia during second tapping.
6½ oz. serum. 4 " " 1 " " 4 " "	4 weeks.	Relieved.	First and third punctures at 8th space axillary line. Second, below angle of scapula. Subsequently two punctures without result at latter point; but nearer median line 4 oz. withdrawn.
6 pints sero-purulent fluid. 3 pints same.	5 weeks.	Relieved.	Complicated with pneumo-thorax. Metallic tinkling and great change in level of fluid noted on changing position. These signs disappeared. Troublesome cough at time of aspiration.
3 pints serum.	5 weeks.	Relieved.	After measles. Entered in acute stage. P. 124; T. 100°; Resp. 44. Great immediate relief when chest was aspirated. Patient discharged before complete cure, at her own request.
40 oz. serum, containing flakes of lymph.	17 days.	Well.	At entrance: P. 96; T. 102.5°; Resp. 36.

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
24	M.	28	Right.	4 days.	Angle of scapula.	Normal.	3 days.
25	M.	28	Left.	During acute nephritis.	Clavicle.	Right of sternum.	16 days.
26	M.	29	Left.	29 days.	Clavicle.	1½ inches right of median line at 5th costal cartilage.	I. 5 days. II. 19 days. III. 33 days. IV. 45 days.
27	M.	29	Right.	12 days.	Clavicle.	Under left nipple.	I. 63 days. II. 91 days.
28	M.	29	Left.	2½ weeks.	2d rib. Left side 1 inch larger than right.		4 days.
29	M.	30	Right.	1 month.	Lower half.		I. 1 day. II. 22 days.
30	F.	30	Left.	10 days.	4th rib.	Under sternum.	56 days.
31	M.	30	Left.	2 weeks.	Clavicle. Left side 1 in. larger than right.	Under sternum.	I. 10 days. II. 28 days.
32	M.	30	Right.	3 weeks.	Clavicle. Right side ½ inch larger.	Outside of left nipple.	I. 1 day. II. 23 days.
33	F.	30	Left.	3 weeks.	Clavicle. Intercostal bulging and tenderness.	At median line.	9 days.
34	M.	30	Right.	4 weeks.	Clavicle. Intercostal bulging.		1 day.
35	M.	31	Left.	6 days.	1 in. above angle of scapula.	A little displaced to right.	27 days.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
43 oz. serum.	14 days.	Well.	At entrance: P. 112; T. 103°. Considerable dyspnœa.
5 pints clear serum.	5 weeks.	Much relieved.	Patient entered for an attack of acute nephritis of 10 days' duration, and recovered before his discharge.
2¾ pints serum. 16 oz. " 15 " " Dry.	48 days.	Well.	At entrance: P. 100; T. 102°; Resp. 30. Diuretics; diaphoretics; local applications.
1 oz. serum. 5½ oz. "	14 weeks.	Relieved.	Patient had small-pox a year before. Slow absorption to 3d rib before tapping. Intercostal bulging noted.
2 pints clear serum.	4 weeks.	Relieved.	Patient had syphilis. Specific treatment. At entrance: P. 108; T. 99.4°; Resp. 32.
7 oz. serum. 2 " "	4 weeks.	Much relieved.	Some distress caused during tapping, which was stopped in consequence.
2 oz. clear yellow serum.	12 weeks.	Relieved.	Retarded by acute tonsillitis, leucorrhœa, and general debility.
3 pints serum. 11 " light-colored serum.	6 weeks.	Relieved.	Marked dyspnœa at entrance.
5 pints serum. 1½ " sero-purulent fluid.	4 weeks.	Much relieved.	At entrance: P. 120; T. 102°; Resp. 40. Dyspnœa, œdema of surface on right side; diarrhœa. Bronchial breathing.
6 pints sero-purulent fluid.	7 weeks.	Relieved.	Complication of acute rheumatism. At entrance: P. 142; Resp. 44. A week later: P. 120; Resp. 52. The latter fell to 32 after tapping.
42 oz. clear serum.	6 weeks.	Well.	Marked dyspnœa. P. 112. Immediate relief from operation.
1½ pints blood-tinged serum.	38 days.	Nearly well.	Steady favorable progress.

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
36	M.	32	Right.	3 weeks.	Clavicle. Intercostal bulging.		5 days.
37	F.	32	Right.	2 weeks.	Lower half.		4 days.
38	M.	32	Left.	8 weeks.	4th rib.		I. 12 days. II. 62 days. III. 116 d's. IV. 126 d's.
39	M.	33	Right.	1 week.	Angle of scapula.		I. 1 day. II. 9 days.
40	M.	35	Left.	2 weeks.	Lower half.	At left edge of sternum.	6 days.
41	M.	35	Right. ½ in. *smaller* than left.	2 weeks.	Angle of scapula.	Normal.	I. 4 days. II. 24 days.
42	M.	35	Right.	1 week.	3d rib.	Normal. Liver depressed.	I. 2 days. II. 12 days. III. 42 days.
43	M.	36	Left.	2 weeks.	Clavicle. Left side 1 in. larger than right.		2 days.
44	M.	36	Right.	4 weeks.	Clavicle. Intercostal bulging.		2 days.
45	M.	38	Right.	4 weeks.	2d rib.	1 inch below and outside of left nipple.	1 day.
46	M.	38	Left.	1 week.	2d rib.	Right of sternum.	I. 1 day. II. 5 days. III. 10 days. IV. 17 days.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
3 pints straw-colored serum.	9 weeks.	Well.	After tapping there was a change of 3 inches in the level of the fluid when the patient stooped. Discharged in 5 weeks; readmitted 1 week later.
26 oz. clear yellow serum.	1 week.	Well.	Discharged at her own request.
57 oz. serum. None. 6 oz. clear yellow. 5 " serum.	132 days.	Died.	General tuberculosis. See autopsy.
A few oz. 5 pints pale yellow serum.	34 days.	Well.	At entrance: P. 98; T. 101°. Dyspnœa not marked. Needle withdrawn during aspiration on account of cough and discomfort.
2¼ pints clear yellow serum.	2 weeks.	Well.	P. 88; T. 99°. Apparent cause, a blow. A portion only of the effusion was withdrawn, although flowing freely. Blisters, 4 by 6 inches. Digitalis; elaterium; citrate of potash.
23 oz., 7 oz. serum.	33 days.	Well.	P. 100; T. 102°; Resp. 27.
3 pints clear yellow serum. 2 oz. " 4 oz. "	8 weeks.	Well.	Brandy for slight faintness at first tapping. Needle became clogged twice at second tapping.
50 oz. clear serum.	53 days.	Well.	At entrance: P. 120; Temp. 103.2°; Resp. 32. Local applications. Diuretics; Hydragogues.
24 oz. bloody serum. Under microscope: blood, pus, and granular débris.	5 days.	Died.	At entrance: P. 104; T. 101°; Resp. 32. A part only of the fluid withdrawn. Respiration remained at about 30, until death, which was apparently due to cardiac failure. No autopsy. See history.
3 pints yellow serum.	3 weeks.	Well.	Aspiration stopped on account of fatigue. After tapping the level of the fluid in front could be raised or lowered by change of position.
47 oz. 4 pints. 40 oz. 35 oz. clear serum.	117 days.	Nearly well.	At entrance: P. 116; T. 103.6°; Resp. 28. Local applications. Elaterium. There was contraction of the chest, which was first noticed 5 days after the last tapping.

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
47	M.	39	Left.	9 weeks.	To nipple.		A few hours.
48	M.	39	Left.	3 months.	Clavicle.		1 day.
49	F.	40	Right.	10 weeks.			I. II.
50	F.	40	Left.	2 weeks.	Clavicle.	1 in. to right of sternum.	8 days.
51	M.	40	Left. 1¾ in. larger than right side.	2 weeks.	3d rib.	Right edge of sternum.	I. Same day. II. 10 days.
52	M.	40	Right.	3 months.	Angle of scapula.		1 day.
53	F.	42	Left.	4 days.	Clavicle.	Below the right nipple.	2 days.
54	F.	48	Left. ¾ in. larger than right.	2 months.	2d rib; intercostal bulging.	Right of ensiform cartilage.	I. 5 days. II. 9 days. III. 11 days.
55	M.	48	Left.	2 years.	4th rib.		
56	M.	50	Left.	5 weeks.	Clavicle.		3 days.
57	M.	50	Left.	2 weeks.	Clavicle.	Under sternum.	9 days.
58	M.	56	Left. ½ inch larger than right.	10 days.	4th rib.	At epigastrium.	20 days.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
7 pints of clear serum.	15 days.	Much relieved.	P. 86; T. 98°. Moderate dyspnœa. Diuretics; Potass. Iodid.; Local applications.
6½ pints clear reddish serum.	55 days.	Well.	P. 120; T. 102°. Considerable dyspnœa. Complicated with Bright's disease (acute?) Tonics.
2 pints. 6 pints of greenish serum, which coagulated on standing.	14 days.	Relieved.	P. 114; T. 102°. Attack came on 4 weeks after birth of 11th child. At time of discharge distant respiration at base.
1 pint yellow serum.	25 days.	Well.	P. 120; T. 99.8°; Resp. 44. Hydragogues; Diuretics. Heart's position normal at discharge.
8 ounces. 10 " serum, tinged with blood.	24 days.	Much relieved.	Discharged at his own request.
½ pint of serum.	2 weeks.	Well.	Pleurisy followed intermittent fever.
8 pints turbid serum.	2 weeks.	Well.	P. 100; T. 98.2°; Resp. 40. After tapping heart returned to median line only.
40 oz. serum. " " 3 pints bloody serum.	54 days.	Relieved.	P. 118; T. 100.8°; Resp. 64. Diarrhœa. Chronic valvular lesion. At discharge, normal breathing and percussion 2 inches below angle of scapula. Tube clogged by lymph at first aspiration; second was stopped on account of cough.
3½ pints dark reddish-brown fluid.	5 days.	Relieved.	This patient came to the hospital ten times, at intervals of about 3 months, to be tapped. Excess of fluid caused pain and cough. Refused to have a permanent opening made.
2½ pints clear serum.	11 days.	Well.	Rapid absorption.
5 pints clear serum.	38 days.	Well.	At entrance: P. 76; T. 100°; Resp. 32.
61 oz. of serum, with reddish tinge.	5 weeks.	Relieved.	At entrance: P. 80; T. 99.6°. Considerable dyspnœa. Local applications; Diuretics.

Number.	Sex.	Age.	Side affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
59	F.	60	Right.		Lower half.		7 days.
60	M.	65	Right.	4 weeks.	Angle of scapula.		2 days.
61	M.	65	Left.	3 months.	Lower half.		2 days.
62	M.	66	Left.	3 weeks.	3d rib.	Right edge of sternum.	1 day.
63	M.	67	Right.	7 weeks (traumatic).	3d rib.	Below left nipple.	3 days.
64	F.	70	Left. ½ in. larger than right.	3 weeks.	Lower half.	Ensiform cartilage.	23 days.

TABLE II. — Six Cases in which Serous

1	M.	23	Left.	6 days.	Spine of scapula. 5th rib in front. Limited by adhesions.	Under sternum.	I. 10 days. II. 15 days. III. 45 days. Incision.
2	F.	25	Right.	6 weeks.	Angle of scapula. Limited by adhesions.		I. 6 days. II. 8 days. III. 13 days. IV. 20 days. V. 26 days. VI. 31 days.

Amount and Character of Fluid.	Stay in Hospital.	Result.	Remarks.
4 pints clear serum.	7 days.	Died.	Ill for 5 months. Paroxysmal cough; dyspnœa; pain. Rheumatism; cardiac palpitation; angina. Death one hour after aspiration. No autopsy. See history.
1 pint clear yellow serum.	6 days.	Died.	Death from exhaustion four days after aspiration. Cough for a year and a half. Greenish, purulent sputa. No autopsy. See history.
20½ oz. clear serum.	9 days.	Died.	At entrance: P. 92; T. 101.5°; Resp. 24. Condition, feeble. Day after tapping, pain in chest. Cyanosis; exhaustion; death in one week. No autopsy. See history.
5 pints clear yellow serum.	31 days.	Well.	Tonics; diuretics.
6½ pints clear serum.	9 days.	Well.	Broken ribs. Increasing dyspnœa for 3 weeks before entrance. Rapid recovery after aspiration.
1 pint clear yellow serum.	38 days.	Well.	At entrance: P. 96; T. 98°; Resp. 40.

Effusions became Purulent after Thoracentesis.

38 oz. of light, cloudy serum. 50 oz. of dark, cloudy serum. 16 oz. pus.	109 days.	Much relieved.	Free drainage through 7th interspace axillary line. Patient treated subsequently in out-patient department, where washing out cavity, which contained one ounce of pus, *caused syncope twice*. Antiseptic treatment.
7 oz. clear serum. 8 oz. clear serum. 5 oz. turbid serum. 10 oz. turbid serum. 7 oz. turbid serum. 11 oz. of pus.	32 days.	Relieved.	Poor health for three years. Phthisical family history. Refused permanent opening, and discharged against advice.

Number.	Sex.	Age.	Side affected.	Duration before. Entrance.	Extent of Effusion.	Position of Heart's Apex.	Time after entrance at which Paracentesis was performed.
3	M.	29	Right.	3 weeks.	4th rib.	5th intercostal space, left mammary line.	I. 7 days. II. 22 days. III. 23 days. Incision.
4	M.	29	Right.	6 weeks.	4th rib.		1. 11 days. II. 13 days. III. 15 days. IV. 18 days. Drainage.
5	M.	34	Left.	9 days.	4th intercostal space.	Under sternum.	I. 5 days. II. 21 days. III. 28 days. Incision.
6	M.	52	Left. 2 ins. larger than right.	4 weeks.	Clavicle.	2 inches below right nipple.	I. 17 days. II. 25 days. III. 55 days. Incision.

TABLE III. 132 Cases in which Effusions

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
1	M.	11	Left.	10 days.	4th rib.	
2	M.	13	Right. Marked intercostal bulging.	2 weeks.	Clavicle.	
3	F.	15	Left.	30 days.	Lower half.	
4	M.	16	Left.	2 weeks.	3d rib.	
5	F.	17	Right.	1 week.	Lower half.	Normal.
6	F.	18	Left.	4 weeks.	Lower half.	

Amount and Character of Fluid.	Stay in Hospital.	Results.	Remarks.
63 oz. clear serum. 8 oz. thin pus. 128 oz. pus.	495 days.	Relieved.	At entrance: P. 142; T. 103.5° F; Resp. 48. Albuminous urine with casts and œdema of extremities. Antiseptic treatment.
14 oz. clear serum. 32 oz. clear serum. 30 oz. thin pus. 8 oz. thin pus.	139 days.	Not relieved.	Patient developed signs of phthisis. Purulent otitis.
43 oz. clear serum. 32 oz. turbid serum. 37 oz. pus.	257 days.	Well.	At entrance: P. 140; T. 104.2° F.; Resp. 60. Antiseptic drainage.
160 oz. red serum. 19 oz. red serum. 11 oz. pus.	80 days.	Died.	In spite of antiseptic precautions the discharge became offensive, and continued so until death occurred from exhaustion.

were Absorbed without Thoracentesis.

Stay in Hospital.	Result.	Remarks.
56 days.	Relieved.	At entrance: P. 144; T. 103.4°; Resp. 60. Local applications; tonics; stimulants. Probably complicated with phthisis.
26 days.	Well.	P. 120; T. 103°. Tonics; blisters, etc. At discharge good respiration to base.
105 days.	Well.	Hydragogues; blisters; tonics.
30 days.	Relieved.	P. 85; T. 102.2°; Resp. 24.
8 days.	Well.	
16 days.	Well.	P. 90; T. 98°. Cough; dyspnœa. Tr. iodin.; iodide of potassium.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
7	M.	18	Left.	4 weeks.	Angle of scapula.	
8	F.	19	Left.	1 week.	Lower half.	
9	F.	19	Left.	5 days.	Lower half.	
10	M.	19	Left.	1 week.	Clavicle.	6th intercostal space right of sternum.
11	M.	20	Left.	18 days.	Dry.	
12	F.	20	Right.	4 weeks.	Lower half.	
13	F.	21	Right.	4 weeks.	Lower half.	
14	F.	21	Left.	4 days.	Dry.	
15	M.	21	Right.	10 days.	3d rib.	
16	M.	21	Left.	2 weeks.	2d rib. Intercostal bulging.	Under sternum.
17	M.	21	Right.	2 weeks.	4th rib.	
18	M.	21	Left.	10 days.	Angle of scapula.	Normal.
19	M.	21	Right.	2 weeks.	3d rib.	
20	M.	21	Left.	2 weeks.	Lower third.	
21	F.	22	Left.	4 weeks.	Angle of scapula.	
22	F.	22	Right.	3 weeks.	Angle of scapula.	
23	F.	22	Left.	3 days.	Angle of scapula.	
24	M.	22	Right.	4 weeks.	Nipple.	Outside of left nipple.
25	M.	22	Left.	5 days.	6th rib.	Normal.
26	F.	22	Right.	1 week.	Lower half.	

Stay in Hospital.	Result.	Remarks.
16 days.	Well.	P. 90; T. 101°. Cough; pain.
8 weeks.	Well.	Complicated with typhlo-enteritis. P. 100; T. 100°; Resp. 44.
8 weeks.	Well.	P. 100; T. 101°; Resp. 46. Anodynes; local applications; potass. iodid.
37 days.	Well.	P. 100; T. 99.8°. Dyspnœa not marked. Potass. iodid.; tonics; local applications.
61 days.	Relieved.	P. 120; T. 103°. Local applications; anodynes.
5 days.	Relieved.	P. 80; T. 98.5°.
2 weeks.	Much relieved.	P. 100; T. 103°. Discharged early, at her own request.
8 days.	Well.	Headache; pain; dyspnœa. Rest; opiates.
16 days.	Well.	Rest; local applications.
2 weeks.	Much relieved.	Cough; pain; little dyspnœa.
5 weeks.	Relieved.	Resp. 34, at entrance.
12 days.	Well.	P. 108; T. 100.2°. Moderate dyspnœa. Rest; tonics.
6 days.	Relieved.	P. 110; T. 100°; Resp. 44. Pain; headache. Pneumonia two years before.
2 weeks.	Relieved.	Resp. 24.
9 weeks.	Much relieved.	Complicated with severe angina and general neuralgia. Præcordial pain; systolic murmur at base. Rheumatic fever three years before.
4 weeks.	Relieved.	At entrance: P. 108; Resp. 28. Purulent otitis, right ear; perforation of tympanum. Discharged early, against advice.
6 weeks.	Well.	P. 140; T. 102.7°; Resp. 36. Rest; hydragogues; diuretics.
4 weeks.	Nearly well.	P. 100; T. 101°. Rest; tr. iodin.; diuretics.
8 days.	Well.	
17 days.	Well.	P. 110; T. 102°; Resp. 43. Rest; morphine; tr. iodin. externally.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
27	M.	22	Left.	5 days.	1 inch below angle of scapula.	Normal.
28	M.	23	Right.	2 weeks.	Lower half.	
29	F.	23	Right.	10 days.	Lower half.	Left mammary line.
30	M.	23	*Both sides.*	2 weeks.	Left, to angle of scapula; right, one inch below.	
31	F.	23	Right.	2 weeks.	Angle of scapula.	
32	M.	24	Right.	2 months.	Lower third.	
33	F.	24	Right.	2 months.	4th interspace.	
34	F.	24	Right.	3 weeks.	Lower third.	
35	F.	24	Left.	1 week.	Lower third.	
36	M.	24	Left.	1 week.	Clavicle.	5th interspace, right of sternum.
37	M.	24	Right.	3 weeks.	Lower half.	
38	F.	25	Right.	6 weeks.	Lower half.	
39	M.	25	Left; intercostal bulging.	3 weeks.	3d rib.	
40	M.	25	Left.	2 months.	Angle of scapula.	
41	F.	25	Left.	4 months.	Lower third.	Normal.
42	F.	25	Left.	1 month.	Lower half.	
43	M.	26	Left.	17 days.	Lower half. Intercostal bulging.	

Stay in Hospital.	Result.	Remarks.
30 days.	Well.	Moderate dyspnœa. Acute rheumatism seven weeks before.
2 weeks.	Relieved.	P. 124; T. 101°; Resp. 28. Swathe; tonics; anodynes. Rheumatism, sub-acute and muscular, for two months.
22 days.	Well.	P. 108; T. 101.5°. Dyspnœa. Rest; local applications; pilocarpine.
52 days.	Well.	P. 92; T. 101°; Resp. 20. Rest for three weeks; local applications; tonics.
23 days.	Well.	P. 80; T. 98.4°; Resp. 24.
5 weeks.	Well.	Rest; local applications.
46 days.	Relieved.	P. 92; T. 100.2°; Resp. 28.
3 weeks.	Much relieved.	P. 136; T. 98.4°; Resp. 42. Local applications; cotton jacket; potass. iodid.; diuretics.
3 weeks.	Well.	P. 94; T. 92.2°. Dyspnœa. Abortion two weeks before. Swathe; chloral; morphine; tonics.
3 weeks.	Much relieved.	P. 105; T. 102°. Moderate dyspnœa. Rapid absorption after active purgation with calomel and jalop. Cream of tartar water. Croton oil and tr. iodine, externally.
8 days.	Relieved.	P. 92; T. 100°. Discharged early, against advice. Returning friction sounds noted.
6 weeks.	Well.	Dyspnœa marked.
19 days.	Well.	P. 104; Resp. 30. Bronchial breathing. Local applications; jacket poultice; morphine.
45 days.	Well.	P. 112; T. 102°; R. 50. Considerable dyspnœa.
3 months.	Relieved.	P. 120; T. 102°; R. 50. Complicated with acute gastric catarrh or ulcer.
1 month.	Relieved.	
24 days.	Well.	Local applications. Tonics; four previous attacks in ten years.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
44	M.	26	Right.	4 days.	Angle of scapula.	
45	F.	26	Left.	5 days.	3d rib.	
46	M.	27	Right.	10 days.	3d rib.	
47	M.	27	Left.	2 weeks.	3d rib.	
48	M.	27	Right.	2 weeks.	Lower half.	
49	M.	28	Right.	1 week.	4th rib.	Below left nipple.
50	M.	28	Right.	3 weeks.	3d rib.	
51	M.	28	Right.	2 weeks.	3d rib.	
52	M.	28	Right.	5 days.	Dry.	
53	M.	28	Right.	2 weeks.	4th rib.	
54	M.	28	Right.	1 week.	Slight effusion.	
55	M.	28	Left.	2 weeks.	2d intercostal space.	At ensiform cartilage.
56	M.	28	Left.	9 months (?)	Clavicle. Intercostal bulging.	1 inch outside left nipple, apparently adherent.
57	M.	28	Right.	2 weeks.	2d rib.	
58	M.	29	Left.	6 days.	Slight effusion.	
59	M.	29	Right.	2 weeks.	Dry.	
60	M.	29	Right.	6 weeks.	Below angle of scapula.	
61	M.	29	Right.	2 days.	Lower fourth.	
62	M.	29	Left.	1 week.	Dry.	

Stay in Hospital.	Result.	Remarks.
1 month.	Relieved.	Diuretics; hydragogues.
7 weeks.	Well.	P. 120; T. 101.2°. Dyspnœa. Local applications; cotton jacket.
70 days.	Well.	Bronchial breathing; no bulging of intercostal spaces.
7 days.	Relieved.	Hydragogues; blisters.
4 weeks.	Well.	P. 90; T. 101°. Diarrhœa.
6 weeks.	Much relieved.	P. 108; T. 99°. Dyspnœa; pain. Rest; swathe; local applications; diuretics; stimulants, etc. Tapped two years before.
19 days.	Well.	P. 92; T. 101°; Resp. 36. Diarrhœa. Blisters; diuretics; tonics.
16 days.	Well.	Rest; anodynes.
5 days.	Well.	P. 84; T. 102°; Resp. 26. Potass. iodid.
25 days.	Well.	Hydragogues; blisters.
45 days.	Well.	Local applications.
11 days.	Relieved.	Rest; local applications. Discharged early, at his own request, against advice.
6 weeks.	Relieved.	P. 86; T. 98.6°; Resp, 39. Aspirated, without result. Pneumonia, with pleurisy, nine months before.
7 weeks.	Well.	P. 128; Resp. 30. Chronic diarrhœa; cough; sweating. Local applications; stimulants; anodynes. No absorption for two weeks after entrance.
18 days.	Relieved.	P. 82; T. 101.8°. Jaborandi.
23 days.	Well.	P. 90; T. 103°; Resp. 35. Local applications; anodynes; tonics.
32 days.	Much relieved.	P. 108; T. 100°. Dyspnœa.
11 days.	Relieved.	P. 100; T. 103.3°; Resp. 24. Pain; headache.
1 week.	Well.	Rest; tonics.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
63	M.	30	Left.	4 weeks.	Clavicle.	
64	F.	30	Right, 1½ inches larger than left.	2 weeks.	3d rib.	
65	M.	30	Right.	2 weeks.	Dry.	
66	M.	30	Right.	2 days.	Lower third.	Below left nipple.
67	M.	30	Right.	2 weeks.	3d rib.	Heart displaced. Liver depressed.
68	M.	30	Right.	2 months.	Dry.	
69	M.	30	Left.	1 month.	3d rib.	
70	M.	30	Left.	3 months.	3d rib.	
71	M.	31	Right.	3 days.	Lower half.	
72	M.	31	Left.	3 weeks.	Angle of scapula.	
73	M.	32	*Both sides.*	6 weeks.	Angle of scapula.	
74	M.	32	Left.	5 weeks.	3d rib.	
75	M.	32	Left.	2 days.	Lower third.	
76	M.	32	Left.	8 days.	Lower half.	
77	M.	32	Left.	5 days.	Dry.	
78	F.	32	Right.	17 days.	Lower half.	Below left nipple.
79	M.	33	Right.	4 weeks.	Lower half.	
80	M.	33	Right.	13 days.	Dry.	
81	M.	34	Right.	6 months.	Dry.	

Stay in Hospital.	Result.	Remarks.
90 days.	Relieved.	Bronchial breathing; no intercostal bulging.
32 days.	Well.	
24 days.	Well.	Following a fall. Pain; friction sounds. Rest; local appliances.
10 days.	Well.	Pain; headache. Local applications; anodynes; tonics.
90 days.	Well.	Patient debilitated by drink; jaundice. Absorption rapid for ten days; afterward slow.
2 weeks.	Well.	Pain; cough. Anodynes; tonics; rubefacients. Suppurative otitis; perforation of right tympanum.
3 weeks.	Well.	P. 88; T. 99°. Pain; dyspnœa. Tr. iodin.; potass. iodid.
6 weeks.	Relieved.	Dyspnœa; debility. Tonics; tr. iodin.
3 weeks.	Well.	
58 days.	Well.	P. 100; T. 104°; Resp. 22. Rest; tr. iodin.; blisters; diuretics.
5 weeks.	Well.	P. 104; T. 100.2°; Resp. 38. Blisters; tonics. Double effusion. Marked gain in flesh and strength.
3 weeks.	Relieved.	Blisters; local applications; tonics.
4 weeks.	Relieved.	Recurrent attack.
10 days.	Much relieved.	P. 93; T. 102°. Dyspnœa; pain; cough. Diuretics; tr. iodin.; cotton jacket. Discharged at his own request.
23 days.	Well.	P. 108; T. 105.4°; Resp. 28. Rest and tonics.
18 days.	Much relieved.	P. 96; T. 92.8°; Resp. 28. Chills; cough; pain. Shoulders raised. Morphine; blisters; tonics; stimulants; potass. iodid.
1 month.	Well.	Local applications.
18 days.	Nearly well.	Diarrhœa at entrance.
9 weeks.	Relieved.	P. 92; T. 98.4°. Slight dyspnœa. Similar attack on same side two years before.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
82	M.	34	Left.	2 weeks.	Dry.	
83	M.	35	Left.	1 week.	Spine of scapula.	At ensiform cartilage.
84	M.	35	Right.	6 days.	Dry.	
85	M.	35	Left.	2 weeks.	Lower third.	
86	M.	35	Left.	2 months.	Lower third.	
87	M.	35	Left.	18 days.	2d rib.	
88	M.	35	Left.	10 days.	Clavicle.	
89	F.	36	Right.	2 weeks.	Dry.	
90	M.	36	Right.	2 weeks.	Lower half.	
91	M.	37	Right.	3 days.	Angle of scapula.	
92	M.	37	Right.	1 week.	4th rib.	
93	M.	37	Right.	2 days.	Angle of scapula.	
94	M.	38	Left. ¾-inch larger than right.	17 days.	2d intercostal space.	
95	M.	38	Right.	2 weeks.	Lower half.	
96	F.	38	Right.	1 week.	Lower third.	
97	M.	38	Left.	3 weeks.	4th rib.	Left edge of sternum.
98	F.	39	Left.	1 week.	3d rib.	Left edge of sternum.
99	M.	39	Right.	6 days.	Lower half.	
100	M.	40	Right.	4 months.	3d rib.	
101	M.	40	Right.	1 week.	Angle of scapula.	

Stay in Hospital.	Result.	Remarks.
17 days.	Well.	P. 108; T. 102.8°; Resp. 30. Anodynes; tonics.
23 days.	Relieved.	P. 100; T. 98.4°. Moderate dyspnœa. Rest; local applications; potass. iodid.
16 days.	Well.	P. 112; T. 102°. Slight dyspnœa. Diarrhœa. Pleurisy on left side fourteen years before. Local applications; anodynes.
17 days.	Relieved.	Local appliances.
6 weeks.	Relieved.	P. 144; T. 103°. Pulse fell soon after entrance to 120. Local applications.
44 days.	Relieved.	Hydragogues; blisters.
68 days.	Well.	Rest; local applications; tonics; potass. iodid.
5 weeks.	Relieved.	P. 112; T. 100.4°. Tonics. Tapped one year before. Phthisis (?).
2 weeks.	Relieved.	P. 76; T. 99.6°.
3 weeks.	Well.	P. 74; T. 102.4°. Cough; chills; pain. Became delirious five days after entrance. Chloral and bromide. Pleurisy came on three months after an attack of typhoid fever.
17 days.	Relieved.	The result of a fall.
17 days.	Nearly well.	P. 90; T. 100°. Local appliances; tonics; potass. iodid.
26 days.	Well.	P. 110; T. 101°. Marked dyspnœa. Rest; local appliances.
2 weeks.	Well.	T. 100°; Resp. 38. Rest.
7 weeks.	Relieved.	P. 114; T. 100°; Resp. 32. Local appliances; tonics.
5 weeks.	Relieved.	P. 100; T. 98°. Cough; pain; dyspnœa. Local appliances; potass. iodid. Pneumonia two years before; intermittent fever.
10 weeks.	Much relieved.	P. 120; T. 102.4°. Dyspnœa; headache. Sputa and symptoms indicated probability of empyema discharging through bronchi.
7 weeks.	Much relieved.	P. 79; T. 102.5°. Cough; pain; dyspnœa. Discharged at his own request, against advice.
8 weeks.	Relieved.	Rest; local appliances; tonics.
7 weeks.	Well.	P. 79; T. 99°; Resp. 42. Diarrhœa. Pneumonia a year before. Morphine; potass. iodid.

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
102	F.	40	Left.	3 weeks.	3d rib.	At median line.
103	F.	40	Left.	24 days.	Clavicle.	Right of sternum.
104	M.	40	Right.	1 month.	1 inch below angle of scapula.	
105	M.	40	Left.	12 days.	Lower half.	
106	M.	40	Left.	3 weeks.	3d rib.	
107	M.	41	Left.	10 days.	3d rib.	
108	M.	42	Right.	2 weeks.	Lower half.	
109	M.	42	Right.	2 weeks.	4th rib.	1 inch left of left nipple.
110	M.	42	Left.	4 weeks.	Angle of scapula.	Junction of 5th rib and sternum.
111	M.	42	Right.	2 days.	Lower third.	
112	M.	43	Left.	2 days.	Lower third.	
113	F.	43	Right.	4 weeks.	1 inch above angle of scapula.	
114	M.	44	Right.	2 weeks.	Lower half.	
115	M.	44	Right.	5 days.	4th rib.	Left nipple.
116	M.	45	Right.	1 week.	Lower half.	Below left nipple.
117	F.	45	Right.	2 weeks.	3d rib.	
118	M.	45	Right.	4 days.	Lower half.	
119	M.	45	Left.	30 days.	Lower third.	

Stay in Hospital.	Result.	Remarks.
5 weeks.	Well.	P. 120; T. 100.4°; Resp. 48. During rheumatic fever; apex systolic murmur. Series of blisters 8 by 8 inches; digitalis; tonics, etc.
5 weeks.	Relieved.	P. 132; T. 98.2°; Resp. 36. Bronchial breathing. Local treatment; tonics. Patient eloped.
9 days.	Relieved.	Pain; dyspnœa; purulent sputa.
3 days.	Relieved.	P. 104; T. 99.8°. Dyspnœa; anodynes; jaborandi.
34 days.	Relieved.	Hydragogues; blisters.
12 days.	Well.	P. 94; T. 100.4°. Tonics; tr. iodin.
18 days.	Relieved.	T. 102°. Cough; pain. Discharged at his own request.
3 weeks.	Well.	Pulse and temp. normal. Bowels constipated. Rest; diuretics.
20 days.	Relieved.	P. 100; T. 100.4°. Dyspnœa. Local applications; diuretics. Pleural effusion absorbed. Complicated with cirrhosis of liver.
1 week.	Relieved.	Rest; local appliances.
4 weeks.	Well.	Fever; headache; nausea. Second attack.
2 weeks.	Well.	P. 80; T. 99°; Resp. 30. Rest; local appliances; diuretics.
2 weeks.	Well.	Tonics; potass. iodid.; tr. iodin.
3 weeks.	Much relieved.	P. 84; T. 102.5°. Slight jaundice. Hard drinker. Tenderness over lower right ribs. Line of flatness curves up toward axilla. Discharged at his own request.
25 days.	Well.	Rheumatic fever four months before; recurred in hospital. All symptoms abated under the use of salicylic acid.
38 days.	Well.	P. 100; T. 101.2°. Pain; cough; dyspnœa. During acute stage lying on affected side painful; later, preferable.
1 week.	Relieved.	P. 88; T. 99°. Rheumatic fever seven years before. Discharged at his own request, against advice.
1 week.	Relieved.	

Number.	Sex.	Age.	Side Affected.	Duration before Entrance.	Extent of Effusion.	Position of Heart's Apex.
120	M.	45	Right.	2 months.	5th rib.	
121	F.	45	Left.	38 days.	Clavicle.	Under sternum.
122	M.	46	Right.	5 days.	Lower third.	
123	M.	46	Right.	10 days.	Lower half.	
124	F.	48	Right.	5 days.	Lower half.	
125	M.	48	Left.	1 day.	Slight effusion.	
126	F.	48	Left.	4 months.	3d rib.	6th intercostal space, 1 inch inside left nipple.
127	M.	49	Right.	2 months.	Lower half.	
128	F.	50	Right.	6 weeks.	Lower half.	
129	F.	50	Left.	3 weeks.	Dry.	
130	M.	57	Left.	2 weeks.	3d rib.	At ensiform cartilage.
131	M.	60	Left.	4 weeks.	4th rib.	
132	M.	60	Right.	6 months.	3d rib.	

Stay in Hospital.	Result.	Remarks.
2 weeks.	Relieved.	Rest; local appliances.
13 days.	Relieved.	P. 88; T. 99.2°. Moderate dyspnœa. Rest; local applications.
10 days.	Relieved.	P. 108; T. 102.8°. Dyspnœa.
5 weeks.	Much relieved.	P. 84; T. 99°. Dyspnœa. Diuretics; elaterium; comp. jalap powder. Tr. iodin.
13 weeks.	Relieved.	P. 128; T. 102.2°; Resp. 40. Pneumonia; empyæma or abscess discharging through bronchi.
1 week.	Well.	Rest.
10 weeks.	Relieved.	P. 150, irregular; T. 100.4°. Dyspnœa. Diuretics; tonics. At discharge, flatness over lower two inches left back; dulness and râles lower left back.
8 days.	Relieved.	P. 76; T. 99°. Discharged at his own request.
1 week.	Relieved.	Tonics; tr. iodin.
7 weeks.	Well.	Blisters; tonics.
24 days.	Nearly well.	P. 120; T. 102°; Resp. 35. Rest; diuretics; hydragogues.
9 days.	Not relieved.	P. 120, wiry; T. 101.7°; Resp. 40. Tonics; stimulants; local appliances. Patient discharged at his own request, against advice.
13 days.	Much relieved.	P. 96. Much dyspnœa. Right chest contracted. Local appliances.

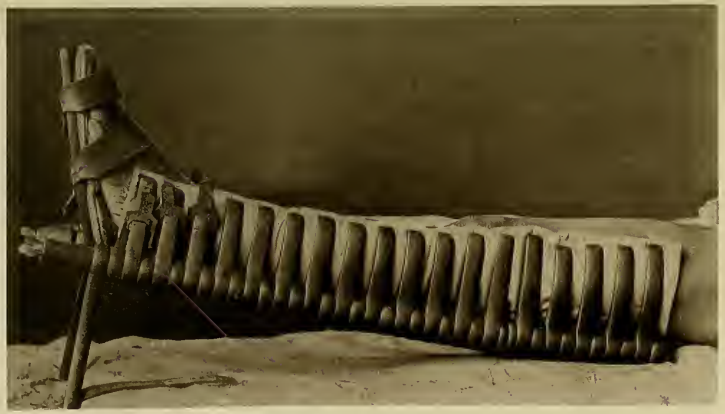
NEW SURGICAL APPARATUS.

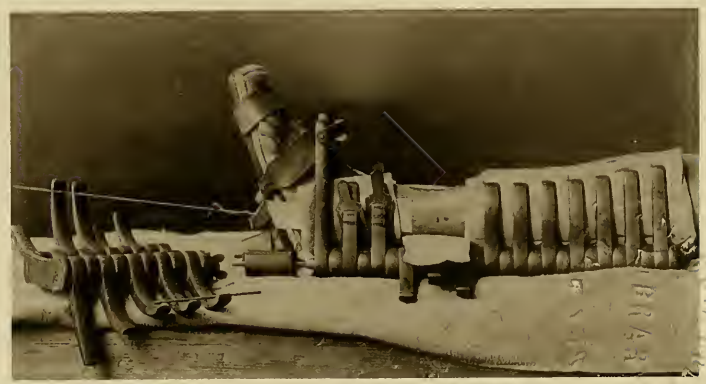
By William P. Bolles, M.D.

The following novelties, designed during the writer's connection with the hospital, and for the most part first tried within its walls, have never been described in print, or to any extent offered to the public; but having answered in his hands good purposes, and having received the commendations of those of the staff who have used them, he places them on record in the official publication of the hospital as the most appropriate channel through which he can offer them to the profession. As they are all mechanical appliances, intended to accomplish purely mechanical purposes, their adaptability can usually be seen and judged of at a glance. On this account he has not thought it necessary to relate the cases in which they were used, or direct the manner of their application, but only to describe them with so much care that any one, who may wish to do so, can make them correctly from the description. In order to prevent that deterioration of shape and quality that almost always takes place when new inventions are left unwatched in the hands of uninterested mechanics for any length of time, he has made the following descriptions full and particular, and drawn a number of illustrations of details, that can hardly be misunderstood, and, if properly followed, will serve to exactly reproduce his instruments in all essential points.

It cannot be expected that a paper written for such a purpose will be interesting continuous reading, or even tolerable to those who do not wish either to make or understand the objects described. If it reads very much like a patent application, it may be remembered that its object is the same, — to thoroughly explain the new inventions.

The use of proper machinery in the cases of the fracture-box, ham-splint-hinge, etc., will reduce what would otherwise be very expensive luxuries, to reasonable cheapness.





BRARY

HELIOTYPE PRINTING CO.

BOSTON.

ADJUSTABLE FRACTURE-BOX.—(PL. No. I.)

This, while answering all the requirements of the ordinary fracture-box, is particularly intended to be used in the more severe cases of compound or complicated fractures, where daily attention — syringing, washing, or dressing — is needed,

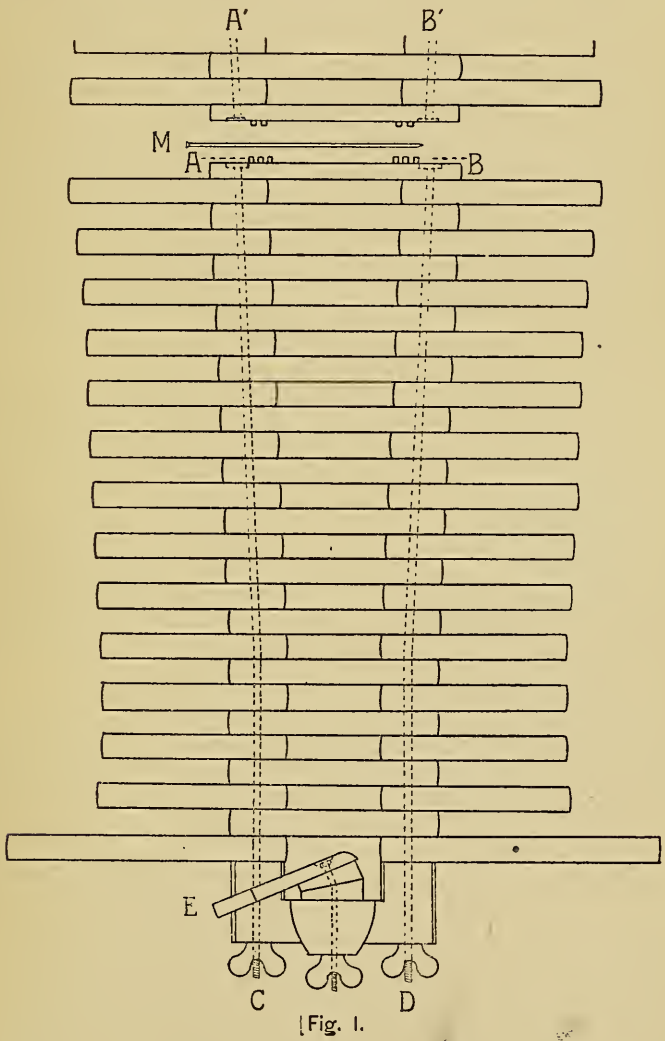


Fig. I.

at the same time with firm and accurate support to all the parts not necessarily exposed for the purpose. It does not of course compete with the plaster of Paris, glue and starch,

or side, or hanging splints, in cases where those forms of apparatus are sufficient; but it is in all cases more comfortable than the old fracture-box, and for the particular ones described above it has numerous important advantages over any heretofore made.

It consists — leaving out of the question the portion above the joint at the knee and the foot-piece, which latter will be described later — of a series of segments, strung, bottom and side pieces alternately, upon two bolts A, C, and B, D (Fig. 1), reaching from the knee to a point below the foot. The bottom segments are pierced at each end with the holes through which the bolts pass, the side segments are traversed by the same bolts through their inner (lower) extremities only, while their other ends are free to move around them as centres. By means of a thumb-nut on each of the bolts these side pieces may be firmly held in any position.

The bolts, which should be smooth and true, of about five-sixteenths inch diameter, of tough material like Bessemer steel, approach each other from the knee to a point somewhat below the middle of the leg, where there is a slight bend in them, below which they are parallel to the end. This enables the five or six lowermost pairs of segments to be removed when it is desirable to apply the apparatus to a shorter leg. A thread is cut upon the bolts up to this bend, so that when the lower pieces are taken off the nuts may still follow up to the remaining ones.

The segments, which form the bottom of the box, are graduated in length, as indicated by the direction of the bolts, becoming shorter from the knee to the bend in the bolts. Below this they are of exactly the same length to the foot; they are large and rounded at each end, perforated by the hole for the bolts, and have circular, flat surfaces around this of exactly the same size in all, and the same also as the corresponding faces of the side segments. These surfaces, by their friction, serve to fix the parts when the nuts are tightened. (Fig. 2.) The middle portions of

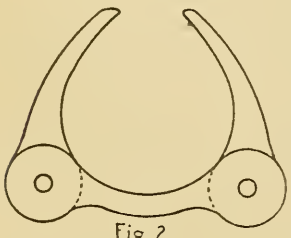
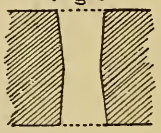


Fig. 2

the different segments are variously cut away above to fit the surface of the back of the leg, and below to remove superfluous material. The drilling of the holes in these pieces is a matter of considerable nicety: if they are large the work will be loose-jointed and clumsy; if small they must be very true; those in the upper ones must be oblique, those in the lower, of course, perpendicular to the surface.

The lateral segments have their attached ends like those of the bottom, but their free ends are narrow and tapered; they are carved to fit the sides of the leg. (See Figs. 3, 4.) Those in the upper part of the leg, where the bolts are not parallel, should have holes slightly larger than the bolts to allow for their diagonal passage; or, still better, should be reamed out from each side. (Fig. 3.) The lower three or four side pieces are notched, for the purpose of supporting leather straps, which serve as slings on which the heel and ankle may rest, and which can be changed, raised or lowered a trifle, without disturbing the limb, and thus the weight of the foot may be supported by different points in succession, and the pain ensuing upon pressure of the heel prevented. (Fig. 4.)

Fig 3.



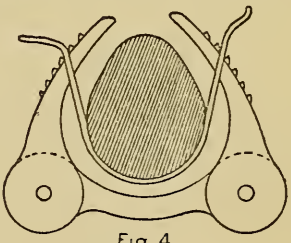


Fig. 4

The lowest bottom-segment, E, F, is larger than the others, and modified to hold the foot-piece, G, which is attached to it by means of a jointed bolt, H, passing through a slot, I. The surface surrounding I is flat, for the same purpose of offering friction as the surfaces around the bolt-holes in the other segments.

The foot-piece is mounted upon two bevelled collars, between which is the joint of the bolt above mentioned, and by means of these collars it can be turned and inclined, to any desirable extent, in any direction. It should be long enough to hold the bedclothes from the toes of the patient and as broad as the foot. It should be provided with suitable holes, screws, pins, or other convenient means of fastening straps, bandages, and padding, and also with a hook for

the attachment of the cord of a pulley when extension is desired. There is a circular depression at the bottom for the nut, M.

The bolt, H, is composed of two pieces, united so as to form a universal joint between J and K. The shorter end passes through J and the foot-piece, where it is retained by the circular flat nut, M. The longer, through K and E, F, and the thumb-nut, L, by means of which all parts are clamped together to make the foot-piece immovable.

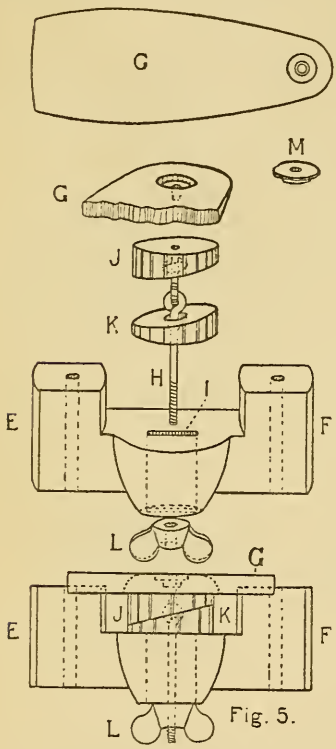


Fig. 5.

The collars, J, K, have their circumferences grooved or roughened, to facilitate turning with the fingers; their other surfaces are flat; that of J which is next to G, and that of K which is next to E, F, are perpendicular to their circumferences, as well as to the holes for the bolt, H; but their contiguous surfaces are oblique, so that by turning one of them upon the other the different positions of the foot-piece are obtained. An excavation for the joint of the bolt has to be made in each, and all their flat surfaces must be perfectly true, to insure a sufficient amount of friction to prevent motion when the nut is tightened.

The portion above the knee is constructed similarly in principle to that below, and is tightened in the same way, by nuts at the upper end. It is united with the leg-piece by hinges, and can be separated from it by drawing the pin, M (Fig. 1), from the hinges.

As will be seen, both from these details and the accompanying heliotype, this apparatus is capable of more complete adjustment than has ever been attempted in instruments of this kind, adapting itself to the limb, not at three or four

points only, but at every inch or two of its entire length; accommodating itself to different sizes and peculiar shapes almost as perfectly as if it were made for each individual case, and having a capacity of turning the foot in every possible direction that a foot can be made to take. The foot can be raised, or the knee bent, or both; parts can be exposed and dressed without danger of displacement, irrigation used, ventilation secured, pressure relieved, or mal-positions corrected, to an extent impossible with the ordinary box without the greatest care and skilled assistants. Extension may be made by screwing the thumb-nuts above the block E, F, when that segment with the foot-piece will slide back and forth upon the bolts, and may be drawn upon with pulleys, the foot being attached to it in one of the usual ways. (See Plate.)

Patients have always expressed satisfaction at the comfort afforded by this box, whenever it followed one of the ordinary kind.

Fore-arm Splints.

The original form of these splints was a curved pattern, made eight or nine years ago, and considerably used by the writer and his friends at that time, with the satisfaction of obtaining very good results with no unusual care, in a

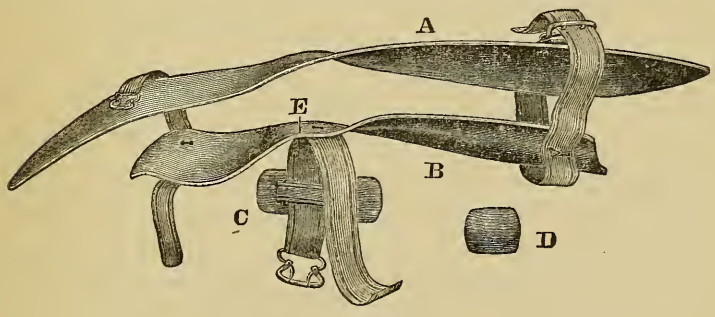


Fig. 6.

number of cases of Colles's Fracture. It was afterwards figured and supplied to a small extent, under the name of the "Spiral Splint," by Messrs. Codman & Shurtleff, who have courteously loaned the accompanying cut. (Fig. 6.)

This still seems to the writer the most perfect form of his splint. As a carved instrument it was necessarily so expensive as to make it almost impracticable, and several attempts have been made to press it into shape from veneers and other flexible material, which are not yet wholly successful.

At about this time the Gordon splint made its appearance in this country, and its system of wooden pads upon a flat board indicated at once the way by which an approximation to the surface of the original spiral splint might be cheaply made; and the present form is the result. (Fig. 7.)

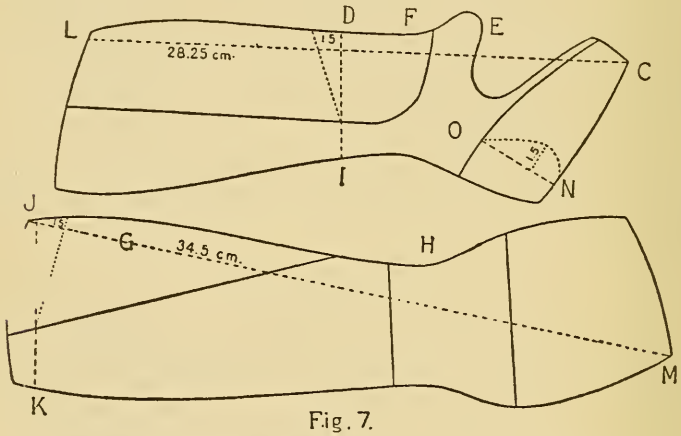
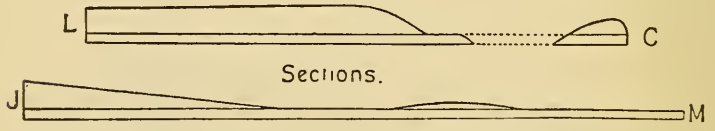


Fig. 7.



Each splint consists of a flat foundation of thin pine, or some light wood, upon which are fastened thicker pieces, so cut as to give an approximation to the desired surface. The outline of the anterior piece is somewhat like that of the Bond splint, being obtained by laying the hand and arm flat upon a board, palm downwards, and tracing its shape; this is then cut off in a line with the knuckles, and has a large recess cut away for the ball of the thumb. A rounded pad at C fills the hollow of the hand, and a bevelled and rounded one at D the concavity of the anterior surface of the radius.

The posterior splint, corresponding in general shape [illegible] the anterior, but longer, has the two pads — G, on the ulnar part, and H, across the wrist — to fill spaces where be always found there.

It is important, in the construction of the anterior that the distance E, F, which corresponds to the [illegible]ment of the lower end of the radius, should be long enough to give it plenty of room, and that the pad above it should be sufficiently high to prevent all pressure upon that part of the wrist; for if the pad is too thin, or extends down as low as the end of the radius, by giving a support to the lower fragment it will keep up the very deformity it is designed to prevent.

Some sections will, without further explanation, give the dimensions which have been found most desirable for a medium-sized splint. This apparatus has been used, both in and out of the hospital, for seven or eight years by the writer and others, during which time several hundred cases have been treated by it, and it has seemed, with the same care, to yield better results than the other patterns tried. The problem in this, as in most other fractures, is only to get the fragments in perfect position, and hold them there comfortably and safely, and can be solved in a variety of ways and by numerous different contrivances, which, in the hands of a skilful and ingenious man, will yield equally good results; but most of the splints for this purpose require considerable special padding for every case, and when these temporary pads are finally correctly arranged, the surface will be found to resemble that already obtained by the wooden pads of this splint, which will be found at least a convenience in this respect. To those but little used to fractures it is still more necessary.

In the writer's experience, of perhaps a hundred and fifty cases, nothing but an even layer of cotton has ever been really necessary to adapt the surface of the splint to the arm. But in three or four cases (and no more) a special pad has been used to secure a more perfect fit. Lateral pads for the ulna and the lower fragment of the radius, to prevent lateral deformity and spreading of the wrist, however, were frequently used.

For all fractures of the forearm below the middle, and for sprains of the wrist, these splints are equally useful; but for fractures at the middle of the arm, or above it, other forms will be found to be better.

Ham Splint.—(Pl. II.)

This is intended especially for cases where a comfortable apparatus, easily removed and applied by the patient, having a strong adjustable locking joint, so compact as to permit the clothes to be drawn over it without cutting, is desired.

The splint proper is more deeply excavated than usual, for the thigh and calf, embracing enough of their surface to hold its place without slipping, and it is fastened on simply by means of the four straps and buckles, shown in the plate; neither plaster nor bandage being required. The front of the limb is protected from the constriction of the straps by coaptation splints of suitable form, above and below the knee, which equalize the pressure as completely as bandaging would do it, and greatly increase the support given by the splint itself. An ordinary ham splint, however, may be used by sawing it at the knee and fastening the hinge upon it. It may be applied either by bandaging and plaster, or by the straps and anterior splints just mentioned.

The hinge is very strong; it consists of two somewhat curved plates, long and broad enough to be firmly secured to the splint. From the back of one of these plates arises one, from the other arise two, vertical interlocking quadrants, having the axes of the hinge as their centre, and bearing a quarter circle each of holes, by means of which, and a pin or thumb-screw, the hinge may be fastened at a variety of angles. Each half of the hinge is a single casting.

If the number of positions were limited by the number of practicable holes in so small a circle as this, they would be necessarily too few, say six or seven, for accurate adjustment; but, by taking advantage of the principle of graduating the vernier and drilling six in one side and seven in the other, about twenty-four positions may be had, which answer most requirements. The hinges should always be fastened to the

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HAM SPLINT. . . . INVALID TABLE.

splints by means of rivets. Screws will loosen and draw out.

Invalid Table. (Pl. II.)

A piece of sick-room furniture, designed for the use of chronic invalids, whose long confinement in bed renders it desirable that they should have a means of reading and writing, as well as eating, in a recumbent position.

In its general shape it resembles the commonly made tables for bed use, having its post or standard at one end and a long foot extending under the bed, while the top projects over it. Like these, also, it is adjustable for height.

It is new, however, in the manner in which this adjustment is effected, and also in the capacity of being inclined for use as a reading rack or desk. The standard consists of two parts, A, B (Fig. 8), one attached to the foot-piece, and the other to the top, loosely bound together by the ferrule, D, E,

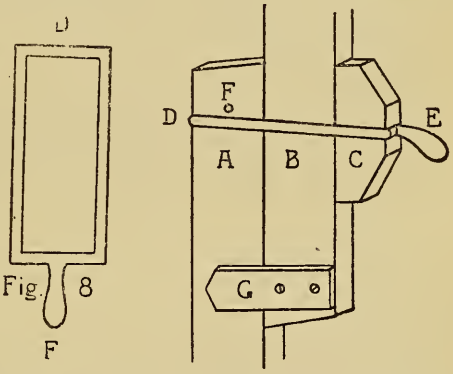

Fig. 8

and capable of sliding against each other. The post, A, which, as it arises from the foot, may be called the stationary one, has near its top, at D, a slight transverse furrow or other contrivance, by which means the ferrule is kept in place, but allowed a slight rocking movement.

The movable post, B, has at its lower end, on each side, a small projecting lip, G, embracing the post, A, and preventing lateral movement. (A groove and tongue upon the contiguous faces of A and B would effect the same purpose, in some respects more satisfactorily.)

A brake, C, is also enclosed with A and B, by the ferrule, and retained by a furrow at E, similar to that of the post A at D, so that while it may move up and down to a limited extent with this end of the ferrule, it cannot escape.

The contiguous surfaces of A, B, and C must be parallel and true.

The ferrule is of the exact width of the above parts, long enough to allow B to slide freely between A and C when it (that is, the ferrule) is held exactly at right angles to the posts, yet so short as to bind firmly, if the end, E, drops a few degrees. It has a small projecting handle at E, by which it may be lifted, and there is a pin at F, on A, to prevent its binding in an upward direction.

When at rest the brake drops by its own weight sufficiently to hold the post, B, and the friction between their surfaces causes any increase of pressure upon the table to only bind these parts more closely together, and so hold them the more securely. The table is thus self-fastening at any height within its outside limits. To raise it, it is usually only necessary to lift it, by taking hold of the top somewhere near the standard, to the desired height and let go; it is instantly and firmly held there; if it sticks a little upon starting, the fingers, underneath the handle at E, can always easily loosen it. To lower the table steady it with one hand and loosen the ferrule by lifting the end, E, when the top will slide easily down to the desired extent, and be caught at once by letting E go free.

The top is divided into two portions, one over the standard, which is always level; the other, supported upon a long horizontal axis, can be inclined to either side and to any required degree, and fastened by means of thumb-nuts. By moving it horizontally upon the axis it can be made to slide over a couple of lips upon the stationary part, that serve to keep it safe when it is not inclined. The ledge for holding books, etc., is reversible, and the table can be used on either side of the bed.

Besides its obvious qualities of simplicity and adjustability it is so constructed that its movable parts can never wear loose or rattle; and it has no inaccessible crevices to serve for the habitation of vermin. This last feature will commend itself to those seeking hospital supplies.

TIN FINGER SPLINTS.

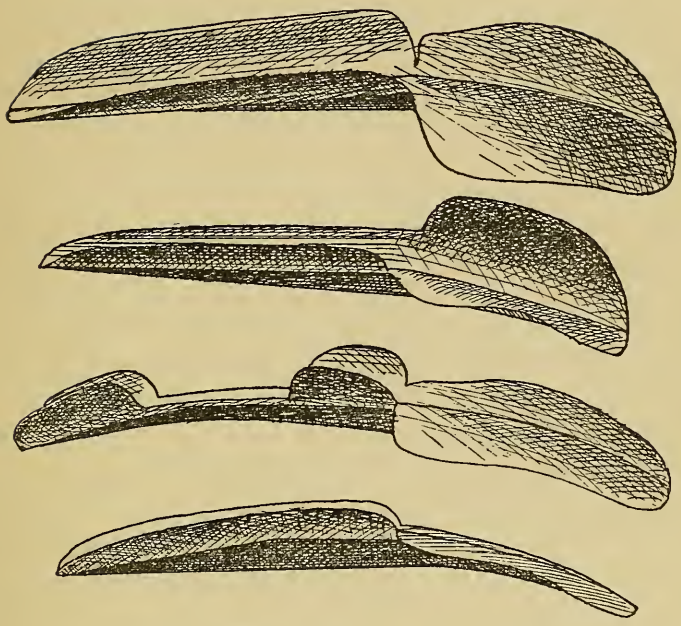

Fig. 9.

These little appliances, while they introduce no new principle of treatment in fractures or other disabilities of the fingers, are lighter, neater, and more convenient than those heretofore used here, whether of wood or tin, and very much stronger than the latter, as ordinarily made.

They consist of a broad, roundish, flat portion for the palm of the hand, and a digital portion made concave, so as to fit the anterior surface of the fingers. A longitudinal fold of the metal extending from one end to the other of the splint, deep in its central portions, but tapering down to nothing at the extremities, serves to give a slight bend to the finger and to stiffen and strengthen it where the old tin splints always yielded or broke; namely, opposite the knuckle-joint.

The introduction of this fold is their chief novelty, and has elevated metal finger splints, as used in the out-patient department, from a very unsatisfactory to an almost perfect condition.

The wooden splints heretofore used here, although having a somewhat similar outline to these, were straight, flat, and clumsy. Tin splints had been, after trial, pretty much discarded, from their liability to bend or break at the junction of the finger with the palm. Gutta-percha was clumsy, uncertain, and expensive; while these are cheap, comfortable, light, perfectly fitting, and permanent.

They may be made of any thin flexible sheet metal, such as tin, zinc, brass, or German silver, and their manufacture, contrary to what might be imagined from seeing the finished production, is simple and easy, requires no apparatus beyond a mallet and vise, and no skill that one or two attempts will not develop, and after a little experience from five to ten minutes will suffice for the whole operation.

Indeed, it is the fact that any one having these two tools can make the splint while his patient is waiting, or make a dozen in some leisure hour, or get a common tinsmith or his house officer to produce them by the score; that contributes to their value, and will excuse the detailed directions which follow.

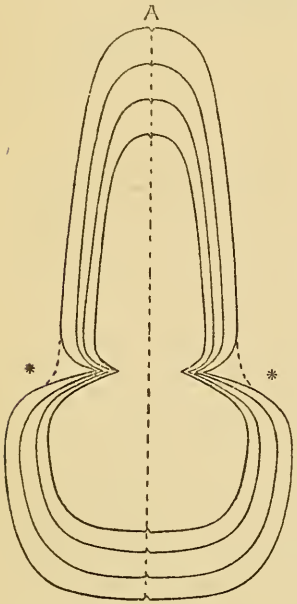

Fig. 10

The metal, say brass No. 25–30, zinc No. 7, or thin tin, must be cut to something like the size wanted; the length should be exact; the sides can be trimmed afterwards. The following outlines (Fig. 10), reduced one-half, will indicate the sizes and shape which have been found to be generally useful, but need not be followed exactly.

It will be better not to cut the notch* until after the fold is made, as a troublesome wrinkle is apt to result in the flattening. The metal is first folded lengthwise along the middle, A, B, and pressed or pounded down until the fold is close, then placed obliquely in the vise (Fig. 11), so the point, C, shall be over the edge of the

jaw, and that about five millimeters of the fold shall be nipped by the vise; but the point A should be just above the surface, and not pressed at all. The two halves are then to be separated and bent down, making the angle along the mouth of the vise as sharp as convenient; but it is best not to completely flatten the splint until after the next step, which consists in taking it out, reversing it, and treating the other end exactly as the first. Then the notches at C can be

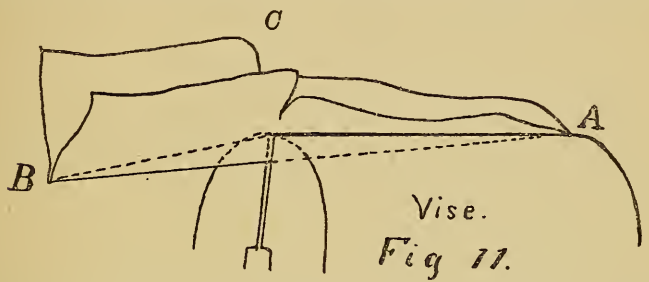

Fig 11.

cut away (unless it is for the index or little finger, when one may be left, if desired), the sides flattened, and the corners beaten sharp. Finally, the digital portion is rounded up over the handle of the vise, the round of a chair, or any convenient cylinder; the palmar portion is shaped a little over the vise, the edges trimmed and filed, and the splint is done. A piece of paper in the vise to prevent scratching, and a bit of broomstick under the mallet to prevent indenting, are refinements.

Variations from the ordinary shape easily suggest themselves. Thus, the depth of the fold determines the angle of flexion, the deepest point the place, and these may be varied within certain limits, and placed under whichever joint is desired; or two angles, and consequently two bends, may be made in the same splint.

Portions of the splint may be cut away to favor ulcerations or enlarged joints, the fold perfectly maintaining its stiffness.

If for the index or little finger, the palmar portion curved around the edge of the hand gives additional support.

A similar fold taken more deeply has been used to give a slight bend at the knee in tin ham splints for small children; and a rather clumsy, but still useful, splint for the back of the thumb and wrist can be made by means of a modification of the same fold.

DIAGNOSIS AND TREATMENT OF DEEP SYPHILITIC ULCERATIONS OF THE THROAT.

By E. Wigglesworth, M.D., and E. W. Cushing, M.D.

During the past three years a large number of patients, with deep ulcerations of the fauces and palate, have applied for treatment at the out-patient department of the Boston City Hospital.

As a rule these had been unrecognized, neglected, or badly treated outside by uneducated practitioners, or druggists' clerks, who, by abundant and ill-timed cauterization, and by over-doses of mercury, increased the disposition already existing of the poorly nourished tissues to break down, and hindered all attempts at repair.

These cases were by no means confined to poor and illiterate members of society, and in many cases the patients were wholly ignorant of the nature of their malady. It may be well to observe that such lesions are often grouped by the general public, following the lead of charlatans, under the head of "catarrh;" that it is chiefly owing to this confounding of diseases that "catarrh" has such a terrible reputation, and furnishes quacks with such power to frighten and plunder their victims, who, suffering perhaps from a slight chronic, post-nasal catarrh, are filled with fears of frightful ulcerations and wasting consumption.

The fact that syphilitic ulcerations sometimes occur in persons above all suspicion of sexual immorality makes it doubly important for the general practitioner to recognize them by their appearance, without asking too many questions; while the brilliant results following rational treatment, even in desperate cases, make even these very satisfactory subjects for treatment.

The appearance of these ulcers is usually quite characteristic, and even when it may not be possible to say certainly that the case is one of syphilis, yet, in the matter of treatment, the doubt is of little consequence. The only maladies likely to occasion doubt in regard to diagnosis are lupus and tuberculosis, and occasionally epithelioma. In cases of lupus the local treatment is identical with that adapted to ulcerations due to syphilis. When tuberculosis exists, with ulcerations of the fauces or palate, or both, the pulmonary symptoms are almost always far advanced; and, even when they cannot be detected, the patient is sure to die of tuberculosis, more or less general, and treatment is practically useless. The possibility, however, that the case may be one of either of these diseases should always make the practitioner careful in expressing an opinion, and considerate in his language, for the peace of a whole family is often at stake; though at the same time neither disease excludes syphilis, and, in the absence of marked pulmonary symptoms, the great comparative rarity of lupus or tuberculosis limited to the throat alone makes it almost always judicious to try the effect of a mild anti-specific treatment, combined with cod-liver oil, alterative and tonic remedies, and the local treatment about to be described; for these are equally valuable in cases of lupus or of syphilis, and can do no harm in those of tuberculosis or of epithelioma.

The "*diagnosis a juvantibus et nocentibus*" thus obtained is more trustworthy in doubtful cases than one founded on the denials of patients, who have many motives for falsehood or concealment, not to speak of honest ignorance, due to the deficient power of observation appertaining to the average patient. Of course in all cases the evidences of syphilis in other parts of the body, or the history of its manifestations, should be diligently sought for; and, if found, warrant a positive diagnosis which the appearances in the throat alone would hardly justify.

The difficulty in distinguishing between ulcerations caused by syphilis, lupus, or tuberculosis, from their appearance alone at any one time, arises from the fact that they are all produced in a similar manner, viz.: by infiltration of tissues

with a mass of small cells, which, not being properly nourished, dies and sloughs out, leaving an ulcer by no means always typical in appearance. There is, however, no difficulty in distinguishing these from simple apthæ or from syphilitic excoriations, or from ulcerations caused by broken or jagged teeth. The first two are shallow, and occur usually upon the tongue or cheeks; for the last there is also an evident local cause. Epithelioma almost always begins either in the lips, or upon the tongue, or in the larynx, and in the last two situations may sometimes lead to difficulty as it has already led to errors of diagnosis; but deep ulceration of the soft or hard palate, the fauces, pharynx, or tonsils, is almost always due to syphilis, though in rare cases it may originate from lupus or tuberculosis, even though there are no other signs of either of the latter diseases.

In these cases, with the exception of tuberculosis, a rational treatment is followed by the most gratifying results; the ulcers rapidly heal, the sloughy base becomes covered with bright granulations, and even the worst cases yield good results. A few cases will illustrate this, although the first terminated fatally: —

Case I. — W. T., aged 19, sent for Dr. Cushing in great haste, the messenger saying that the patient was dying. On arrival, he was found to be bleeding from a huge chasm, comprising the pharynx, fauces, and choanen; the hard and soft palates were gone. The hemorrhage was checked by a wad of cotton soaked in a solution of tannin, which was carefully removed the next day; a slight hemorrhage ensued, which ceased on application of cold water by a syringe through the nose. Patient was very weak, and suffered from anasarca of the lower extremities, and from great difficulty in swallowing food. Urine albuminous; no fever. He died, exhausted, on the fifth day. His father had syphilis; his mother was already infected at the time when he was born, and at this time showed evidences of syphilis in ulcerating gummata of the skin. The patient "had never had an opportunity of contracting the disease himself," and there was in his history the fact of symptoms of syphilis soon after his birth.

Case II. — Lizzie T., aged 33, married eleven years, applied for treatment, with the following history: —

Soon after marriage she miscarried, and this happened three times subsequently. Had been separated from her husband, a dissolute man, for several years; "never had intercourse with any other man." Had sore throat seven years ago, and at intervals afterwards. For last three years her throat had troubled her greatly, becoming, in spite of treatment, steadily worse. On examination, the whole of her soft palate was seen to be gone; also, a triangular piece of the hard palate, about three ctm. wide at the base, the loss of substance extending forward to within three ctm. of the teeth. The whole surface exposed to view was ulcerated, sloughy in places, in others partly covered with unhealthy granulations; the whole bathed with a foul, yellowish secretion.

The patient was unable to speak intelligibly, owing to loss of palate; she swallowed with great difficulty, was much emaciated, and very weak. She was admitted to the hospital for rest, proper food, and general treatment, which consisted of cod-liver oil, ferric iodide, and potassic iodide. Three times weekly she came to the out-patient department for local treatment, which consisted in the topical application of iodine spray, and insufflation of iodoform. It was easy to observe the very beneficial action of the spray in cleansing and stimulating the parts; large quantities of foul secretion were washed away, and after about two weeks the ulcerated surfaces began to be covered with healthy granulations, which bled slightly under the influence of the stimulant spray. The patient remained under treatment in the hospital for about four months, when she was discharged stronger, stouter, and well able to take food. She came as an out-patient for local treatment, for two months longer, at the end of which time the whole surface was cicatrized. About a year later she reappeared, complaining of contraction of the jaw; and, in fact, she could only open her mouth a distance of two ctm., owing to a tough cicatrix over the left masseter muscle. The tongue was adherent to the posterior pharyngeal wall to the extent of one ctm., also to the left side of the pharynx, the arches of the palate and the tonsil, leaving a relatively small

opening for swallowing and breathing. She experienced no great difficulty, however, and was chiefly concerned about her speech, which was nearly unintelligible, owing to the absence of the palate. A skilful dentist, however, arranged a plate which remedied this entirely, and her health has been good for the last year.

Case III. — John D., aged 23, presented himself at the hospital suffering from a deep ulceration on the point of the tongue, and another in the pharynx. The ulcer upon the tongue was round, two and one-half ctm. in diameter, one ctm. in depth, its base uneven, the secretion yellow and scanty; there was no inflammatory areola, and very little swelling of the tongue. No history of syphilis, but possibility of infection not denied. No symptoms of phthisis pulmonum. Admitted; was given cod-liver oil, tonics, and potassic iodide. The diagnosis was probable tuberculosis with possible syphilis, as the ulcer on the tongue looked much like a sloughing gumma. The pharyngeal ulcer was long, shallow, painful, yellow at base, the sides not punched out; there was no inflammatory areola. Locally iodoform was used, with some relief to the pain; also iodine spray. The lingual ulcer utterly refused to heal; that in the pharynx spread, and others appeared as minute yellow spots near its borders, these last ulcerating themselves subsequently. Fever came on in about three weeks; the patient went home at the end of five weeks; laryngeal ulcerations soon came on, and dyspnœa and cough appeared, with fever and inability to swallow. There was great dysuria, and the patient perished miserably of general tuberculosis seven weeks from his first appearance at the hospital, and about ten weeks from the inception of the ulceration on his tongue. This case is very interesting, from the fact that lingual tuberculosis appeared before any pulmonary symptoms could be detected by the most careful observation. Such cases are rare, but well authenticated.

The first of the kind published, of which we have knowledge, was in a memoir read to the Academie, in 1869, by Dr. W. Trélat. This case consisted in a "small nodule, firm rather than hard, occupying the left border of the tongue, a little in front of its centre."

The nodule was ulcerated at its summit, which was directed towards the inferior surface of the organ, and the ulcer, with abrupt edges, rosy-gray base, nodular, and vegetating, was about one ctm. broad, and somewhat irregular in contour. In front and quite near were two little superficial ulcerations, and some days later there appeared several little grayish-yellowish spots, the semeiologic value of which was not then appreciated.

There was no symptom of syphilis, no cough, souffle, nor hemorrhage of any sort; although mastication was somewhat impeded, no bad teeth, no swelling of the submaxillary glands, and not much thickening around the ulcer. No positive diagnosis was made. Antisyphilitic treatment was tried for a month, and then the patient went home. Six months afterwards he returned. The ulceration was somewhat larger, extending towards the frenum linguæ; it had become painful during mastication; the base was gray; the entire tongue was stiff, seemed a little swollen, and was bathed in copious saliva, which the patient was obliged to wipe away frequently. The little yellow points mentioned above had become somewhat more numerous, and extended beyond the median line toward the right side; the submaxillary glands were unaffected, as before. Dr. Trélat was more undecided than ever. Therapeutic measures had made syphilis improbable; the lesion was still less like an epithelioma. Various washes of borax, tannin, and tincture of iodine were tried unsuccessfully during a month, at the end of which time the patient again left the hospital, on February 20th.

On May 26th he reëntered the hospital for the last time. There were now some signs of pulmonary tuberculosis at left apex. His condition was much aggravated; the right border of the tongue was occupied by an ulcer similar to that on the left; the inferior surface of the organ was invaded, and on the dorsal surface could be seen little erosions surrounded by a bright-red margin; the tongue was swollen and very painful, mastication impossible, salivation abundant and continual; and there existed insomnia, insufficient nutrition, anxiety, and emaciation. The tongue was thoroughly cauterized by the hot iron, under anæsthetics, by advice of M. Broca. The

eschars came away in the beginning of June, and subjacent surface was pale-yellow. The ulcers were twice touched subsequently with a caustic solution of carbolic acid. The results were excellent; the tongue was very little swollen, more supple, less painful; the points cauterized were pink and of healthy appearance; nourishment much easier. Hopes of a cure were entertained, when, on June 17th, the patient had a chill, and died, on the 28th, of acute miliary tuberculosis of the lungs, mesentery, etc. The tissues of the tongue at the level of the cauterized ulcerations were found to be studded with little gray, opaline, miliary granulations, blending at their peripheries with the surrounding tissues, and penetrating to a depth of about a centimetre. M. Trélat is satisfied that the actual cautery is useful in such cases as a relief from pain and swelling.

Ricord published a similar case, where pulmonary symptoms did not appear until about eight months after buccal ulceration of a tuberculous nature was observed. Such cases are rare, and may give rise to grave errors of prognosis and treatment unless recognized. When, as is usual, the ulcerations appear in persons evidently phthisical, the diagnosis is easy, although it must always be remembered that syphilis and tubercle do not exclude, but on the contrary aggravate, each other. M. Trélat in his case very properly drew attention to the minute, grayish-yellow spots appearing in the neighborhood of the ulceration, and afterwards breaking down into minute ulcers, and perhaps thus irregularly enlarging the original ulcer, — a process which had been already very carefully described by Türck in connection with tuberculous ulceration of the larynx.

Case IV. — Mrs. H., aged 53, married. Had always been healthy and of exemplary character. Three years ago contracted syphilis from her daughter by inoculating her finger at time of the daughter's confinement. She, in turn, had contracted the disease from her husband; and, by his confession, and by the symptoms of mother and infant, there could be no doubt as to the nature of the disease. Three months before applying at the hospital Mrs. H. had what she

supposed to be diphtheria, which had left an ulcer in the hard palate in the median line, three mm. in diameter. In order to improve her voice the patient used to make a small piece of thick brown paper adhere to the roof of her mouth. The ulcer was perforating, with yellow, uneven, perpendicular edges. There were in some places pale and unhealthy granulations. Much ozœna, with swelling, redness, and tenderness over the nasal bones. Potassic iodide with mercuric bichloride were given, and the iodine spray was used vigorously, especially by sending it through the opening in the palate. The case was rather tedious; the nasal bones exfoliated and small pieces of them came away, but these were replaced by new bone from the periosteum, so that the nose did not fall in, although it remained somewhat thickened. Several pieces of bone were removed through the opening in the palate, the largest, one and a half ctm. long and one ctm. wide, triangular and apparently a part of the vomer; another irregular piece, very offensive, was apparently part of the ethmoid. The bones could be felt with a probe, denuded and partially loose; finally they became so loose that, with great care, they were detached and removed at intervals, by forceps, through the palatal opening, which then soon healed, and the ozœna ceased. The patient apparently recovered her general health perfectly.

Case V. — Louisa P., aged 27. Six weeks ago first noticed sore throat, which was cauterized; soon after there was an ulceration of the genitals; an old ulcer of the leg, where bone had been removed many years before, also reopened. Two weeks ago noticed an eruption on face, which is still visible, and is a papular syphiloderm.

January 7th applied for treatment. Throat shows shallow ulcerations of arches and of posterior wall of pharynx covered with gray secretion, surrounded by shining or partially opalescent tissues. Potassic iodide and ferric iodide internally, iodine spray locally.

January 26th. General symptoms better, eruption gone, ulcer of leg much better, nearly healed. Ulcers on arches healed, on posterior wall of pharynx much improved.

February 5th. Ulcerations all healed, general health much improved.

Case VI. — Mrs. J. D., aged 34, married. Appeared at the hospital suffering from an ulcer perforating the hard palate, and with symptoms of necrosis of the nasal bones. The ulcer was round, three mm. in diameter; situated in the median line, twelve mm. from the junction of the hard and soft palates. A smaller ulcer, two mm. in diameter, perforated the soft palate a little to the right of the median line. Dead bone could be felt with a probe through the larger opening. The ulcers were irregular, their secretion scanty, and there was no inflamed areola. No history nor symptom of syphilis in the case of the patient nor in that of her husband. Correspondence with the family physician, whose intimate knowledge of the case covered a period of ten years, failed to supply any history of syphilis. It was ascertained, however, that the mother and an aunt of the patient had died of phthisis; also some remote members of the family. Patient had some cough, had lost greatly in weight, and night-sweats had recently appeared. The ulcer had first been noticed about three weeks previously. It was diagnosticated as probably lupus, and cod-liver oil with malt and iodide of iron were ordered internally. Locally iodine spray and iodoform were used three times weekly, being blown in through the ulcers. The nose was kept clean by the daily use of the nasal douche, with a warm solution of potassic chlorate and permanganate, and sodic carbonate. Under this treatment the patient rapidly improved in health and strength. The night-sweats ceased in a week, and the patient gained in weight. The smaller ulcer healed in two weeks; the larger decreased, but remained open for six weeks, at the end of which time a piece of the vomer, triangular, and extending six mm. upon each side, became loose and was extracted through the ulcer. The patient was soon well, and has remained so, under observation for three years, up to the present time.

Case VII. — Mrs. A., aged 50, the buxom widow of two husbands, came from the country to consult Dr. Wiggles-

worth for a perforation of the soft palate, rather larger than the end of a Faber's lead-pencil. No prior sensations except a slight abnormal feeling in the fauces, for a few days, and a small "hump," perceptible to finger and eye, about the centre of the soft palate on a line with the uvula. No pain; some difficulty in swallowing. Found on rising one morning that she "talked through her nose, and part of her breakfast went up instead of down." Examination showed a complete perforation with clear cut edges; at present her hearing is good, voice not specially nasal, no pain, deglutition causes some annoyance. The perforation is about the same size as at first. There are no signs of scrofula, and patient has always been "strong as the best of them." She expressed doubts as to the general physical condition of her second husband; but is reticent as to details, and admits nothing as regards herself. In such a case, however, no history is needed. The ulceration was swabbed once with a saturated solution of nitrate of silver. Then iodoform, made into a paste with alcohol and glycerine, was inserted upon a plug of surgical cotton into the aperture, and the patient was directed to renew it three times a day, after meals. One gramme of potassic iodide in a *cup* of water three times a day between meals; and half a teaspoonful of the syrup of the ferric iodide, *with* each meal, *after the first few mouthfuls* of food, in *a sherry wineglass* of water, were given internally. Dry baths (*i.e.*, friction), fresh air and exercise, strong diet, regulation of all the bodily functions, etc., were of course insisted upon. Four days later the patient reappeared to say that she was going home. The perforation was closing fast. She continued treatment, and seven days later, eleven from the day when she was first seen, word was received that there had been "no more signs of the hole for several days." Everything here favored rapid recovery; still the case shows what may be done by combining suitable remedies, in sufficient amounts, and attacking simultaneously along the whole line.

Case VIII. Edw. M., aged 27. From June 23d to July 3d, 1880, was in company with one woman, and had been with no other for two months previously.

July 5th. Noticed small chafe on exterior of penis, and a small scab, which healed under treatment in six days. No roseola nor alopecia was noticed; no headaches, nor pain in bones.

December 1st. Noticed pain and difficulty in swallowing; has observed nothing else to date.

January 5th, 1881. On examination, scar is visible on penis; no induration of inguinal glands, but some of the cervical. In the region of the niche over the left tonsil a deep ulcer is found; this is nearly hemispherical, about one and two-thirds centimeters in diameter and one centimeter deep, seated in thickened tissue. The periphery is regular, punched out, with grayish-yellow secretion, showing fundus in places; this latter is apparently formed of muscular tissue. Treatment: Potassic iodide and mercuric bichloride internally, and iodoform in powder locally.

January 7th. Somewhat better.

January 14th. Ulcer is smaller and shallower, with a redder base, which is clear and covered with minute granulations; pain has disappeared.

January 22d. Ulcer filled up to a level, with healthy granulations, throat otherwise natural; patient feels strong and well; treatment continued.

February 6th. Ulceration wholly cicatrized.

Case IX. Lizzie W., aged 42, had an illegitimate child twenty-three years ago; the infant had "snuffles" soon after it was born, but no eruption, and died of consumption in its sixteenth year. Indistinct remembrance of glandular abscesses in groin at intervals after birth of child. No eruption remembered; frequent attacks of quinsy. Last August throat became sore in region of soft palate. Patient had treatment outside the hospital during several months, both by gargles and "for the blood;" used also Wei de Meyer's catarrh snuff.

February 2d. On applying at the hospital there is seen on soft palate and base of uvula a triangular, deep, inflamed ulcer; edges irregular and steep, areola red; base uneven, gray, smeary; secretion scanty. Small spots on pharyngeal

posterior wall are ulcerated. Touched with stick argenti nitratis.

February 7th. Ulceration larger, spreading over half of uvula, cutting through part of base of uvula upon the right side; elsewhere some few granulations are visible. Small ulcerations have appeared around the large one. Locally, iodine spray and iodoform daily; potassic iodide and corrosive sublimate internally, with cod-liver oil.

February 9th. Ulcer no larger, granulations in centre more abundant, pharynx much as at first. The small yellow ulcers visible last time around main ulcer are not changed; secretion more abundant and purulent, areola less inflamed. Complains of pains in vault of cranium on lying down; these are relieved by potassic bromide.

February 15th. Ulcer granulating well; spots in pharynx and in periphery of ulcer are all healed. Much secretion is washed out of ulcer by the iodine spray, which causes slight bleeding from the granulations.

February 25th. Floor of ulcer level with surface of surrounding mucous membrane, from which cicatrization is rapidly extending. Corrosive sublimate is now omitted.

March 1st. Ulcer entirely healed, general health much improved.

Case X. — Victor M., aged 42, gives a clear history of syphilis contracted seven years ago, and treated with apparent success by mercuric protiodide. On examination, January 19th, the anterior third of the tongue was enlarged and bright-red, showing hypertrophy of papillæ, slight in centre, much greater at the sides. Superficial aspect of rest of tongue pearly; underneath purplish edges corrugated, worm-eaten, ulcerated. Ulcers with overhanging edges indented like the teeth of a comb; not much secretion. End of tongue is square, not pointed; sides papillomatous; depressions showing neither granulations nor marked secretion. Great pain on left side of tongue, where it rubs against the teeth. Glands on right side of neck much enlarged; left side of neck hugely swollen, inflamed, and about to suppurate. Admitted to hospital January 19th. The abscess, when opened,

discharged one hundred and thirty gms. of pus; treatment by potassic iodide, iron, and tonics.

February 21st. Abscess healed; some discharge from an opening on the right side of the neck. Tongue in previous condition, perhaps not quite so large; not so many ulcerations, but one rather large one in left anterior corner. Treatment continued, with use of iodoform locally.

March 14th. Abscesses all healed. Ulcer on tongue filled up to a level by granulations, but not wholly cicatrized. Some spots in periphery of ulcer are yellow, and apparently about to break down.

Case XI. — John M., aged 23, was in hospital in April for ulceration of throat and inability to swallow, at which time his lungs were found to be somewhat diseased. In August went to the Dispensary, where an ulcer in his palate was cauterized. This healed, leaving a scar, not tendinous nor star-shaped. In December ulcers again formed, now in left fauces, upon anterior pillar and tongue, in niche, and on posterior pillar; also on right side, at root of posterior pillar. Patient cannot swallow solid food; breathing somewhat noisy.

December 26th. The ulcerations are elongated, superficial, non-inflammatory, in lateral rather than median region of throat; the edges are irregular and poorly defined, the base pale and unhealthy; the secretion thin, scanty, grayish. The larynx is much swollen; one arytenoid cartilage is immovable. The chords are ulcerated. Diagnosis, tuberculosis of fauces and larynx, with perichondritis of larynx. Incipient phthisis in the lungs. There is no history nor lesion indicating syphilis, except the scar on the palate. Cod-liver oil and tonic treatment were given. Ulcers were touched with silver nitrate, a two-per-cent. solution, thus relieving the sensitiveness.

January 17th. New ulcerations of similar nature from around margins of old ones. Pulmonary symptoms worse, strength failing. Larynx not visible, but more painful. Prognosis evidently very unfavorable.

It is not always possible to diagnosticate the malady causing ulcerations of the mouth or throat, the local pathological condition being practically the same, whatever may be the underlying constitutional disease, viz., an enormous amount of small cells, packed so closely that they cut off the sources of nutrition. The age of the patient, the history, and the presence of other symptoms, must be taken into account, and, finally, it is sometimes necessary to suspend judgment until the failure or success of remedies clears up the nature of the case. Nevertheless, in very many instances a diagnosis may be made at sight, and sometimes it is very important to avoid asking questions. The syphilitic ulcer may be first a sloughing gumma, round, or nearly so, deeply hollowed or punched out, in thickened tissue; usually of the palate, palatine arches, or uvula, with gray, adherent secretion, without granulations, and with an inflamed areola. The gummata may be large or small; in the latter case they may be confined to the mucous membrane, and are then sometimes called syphilitic tubercles; large gummata are very apt to penetrate to the muscular layer, or to the periosteum of bones, and are, therefore, very destructive, often involving the bones of the nose and hard palate, sometimes even of the base of the skull; in either case the microscopic condition is the small-cell infiltration, aggregated into definite, more or less globular masses, of various sizes.

Occasionally, however, this infiltration is not limited, but diffuse, occupying considerable tracts of tissue, such as the whole of the soft palate, or one or both of the palatine arches. In the same way the vault of the pharynx, the nasal structures, or the larynx, may be invaded. This condition, known as hard œdema, or hyperplasia, is insidious and very dangerous; for it may suddenly give rise to rapid destruction of large tracts of the tissues, a so-called melting or liquefaction, which is neither arrested nor benefited by immediate cauterization, although constitutional treatment appears to rapidly improve the condition of the partially infiltrated adjacent tissues. The appearance of such ulcers is characteristic; in a brawny, indurated, swollen tissue, is a deep, steep, ragged ulceration, with adherent, gray, sloughing

base; no attempt at granulation; a red areola; very little or no pain; and much less difficulty in swallowing than one would expect. But as the extent, depth, and density of the infiltration is variable, of course not all syphilitic ulcers are so well marked; they may be more indolent and hard, resembling epithelioma; serpiginous, shallow, and irregular, simulating tuberculous ulcerations, and in some cases it is impossible to make a diagnosis merely from the local appearances; the history and other symptoms must be considered, and also the rapidity and course of the ulcerative process, the action of remedies, and the final result. It is very seldom that the mistake of confounding this condition with epithelioma can be made after ulceration has set in; the syphilitic ulcer tends to assume a circular form, while epithelioma shows deep, irregular excavations, and hard, projecting vegetations, which are wanting in syphilis and tubercle. The adjacent tissues in epithelioma are usually harder and thicker, the progress slower, and the results always unfavorable; therapeutics being powerless to arrest the march of the disease [unless we can credit the claims now made for Chian turpentine] except by wholly removing the affected parts. Tuberculous ulcerations occur almost always in persons who are otherwise tuberculous, or at least reveal a tendency towards phthisis, or have a history of it in the family. The ulcers attack chiefly the tongue and posterior wall of the pharynx, or the larynx. Syphilis appears oftenest in the hard or soft palate, uvula, palatal arches, epiglottis, and larynx proper. Tuberculous ulcers are chronic, lasting from six months to more than a year, slowly spreading, hardly ever healing. They are quite painful, cause a flow of saliva, and rarely occasion swelling of the neighboring glands. They are more superficial than those of syphilis; the adjacent tissue is less thickened, and often pale, although the immediate border of the ulcer is red. Finally, careful inspection usually reveals small grayish-yellow spots near the periphery, which are aggregations of miliary tubercles about to break down into minute ulcers. When this occurs, these spread, coalesce, and finally unite with the original ulcer, causing a most irregular outline; treatment is useless, and death occurs sooner or later

from general tuberculosis. Of lupus, or of scrofulous ulcers, it may be said that they sometimes resemble syphilis very closely, and, unless there be some other manifestation of lupus, it would be hard to find any clearly diagnostic points of difference. They may perforate the hard or soft palate, or may destroy the nasal structures, thus simulating syphilis very closely; so, if any history of the latter was found, they would be reckoned among its symptoms. They do occur, however, when there is no history nor reasonable suspicion of syphilis, and this fact must be remembered before expressing an opinion that may do irreparable damage to an innocent person. Potassic iodide seems to have little or no effect on them; but iodine spray, ferric iodide, cod-liver oil, and fresh air, with good food, suffice to cure them.

In regard to the treatment of syphilitic ulcers it may be said that stimulants are far better than caustic applications. The latter are only useful in hastening the destruction and separation of parts of the circumference of ulcers which are evidently doomed to perish. In general it may be said that an over-use of caustics is the customary treatment of such ulcers, judging by their history and condition when seen at the hospital. It is very seldom that the tissues fail to respond immediately and favorably to the treatment with iodine spray and iodoform, about to be described, combined with constitutional medication.

Ulceration is arrested immediately; the unhealthy pus is washed out from between the granulations; the smeary, gray, sloughy bases clear up, and in a few days the whole ulcer is covered with fine, red granulations, which bleed slightly under the influence of the spray. Prodigious amounts of unhealthy secretion are sometimes brought away from the vault of the pharynx and the posterior nares, to the great relief of the patient and to the great improvement of his digestion and nutrition, while at the same time the fetor of the breath is abolished.

The customary strength of the solution used for atomization is one-ninth the strength of the tincture of iodine; or, tinc. iodinii, five parts; glycerine, ten parts; water, thirty parts. The most convenient instrument to use is that known

as Fulgraffe's, which is made of hard rubber, with nozzles of various shapes; one to send a stream of spray up behind the soft palate, one for a horizontal stream, and one for use in the larynx. The bottle should be kept nearly full, in order that the stream should not be kept up longer than is intended, owing to compressed air remaining in the bottle. The spray is formed by driving a mixture of air and fluid through a narrow opening. Three or four applications, of twenty seconds each, will be sufficient to thoroughly cleanse and stimulate any ordinary ulcerations. After the use of the spray, iodoform should be applied to the ulcer with a camel's-hair pencil, or blown on to it by an ordinary insufflator, or by a bottle connected with two glass tubes, one of which is attached to a hand-ball or mouth-piece and passes below the surface of the cork, while the other, starting below the level of the powder, is bent so as to conveniently carry the cloud of air and powder to the surface of the ulcer. A little powdered gum arabic mixed with the iodoform makes it adhere better. By this means the physician avoids handling the powder and scenting his hands or clothing. Iodoform can also be conveniently deposited on the nasal mucous membrane by letting the patient inhale a saturated solution of the drug in ether.

Some cases require the use of the nasal douche with disinfectants. A convenient formula is, — one teaspoonful of chlorate of potash with one-third as much carbonate of soda or saleratus, and fifteen drops of five-per-cent. solution of permanganate of potash, all in a quart of water, at twenty-five degrees centigrade, used with a fountain syringe. It is well to remember that a spray or a powder carried by a current of air may be used by blowing it into one nostril while the patient breathes through the open mouth. The spray then passes through the vault of the pharynx and escapes by the other nostril. If desirable, by instructing the patient to breathe through the nose, a powder may be blown into the larynx through the nostril.

Of course constitutional treatment is of vital importance; it is hardly necessary to discuss it here, except to emphasize the fact that these deep ulcerations occur late in the course

of the disease, from two to twenty or more years after the primary infection, usually in cachetic individuals. Mercury, therefore, plays a less important part in the treatment than iodine and its compounds. Cod-liver oil, ferric iodide, potassic iodide, iodine spray, iodoform,—these are the great remedies, and it is only in rather robust individuals, especially where mercury has never been used sufficiently or properly, that .003 to .005 grammes of mercuric bichloride or biniodide, given before meals, in five grammes of wine of iron, will prove of advantage. Exercise, fresh air, good food, and cleanliness must not be forgotten, and if all these means be suitably employed, the most frightful syphilitic ulcerations will usually heal with surprising rapidity. The diagnosis of lupus is of less importance practically than might be supposed, inasmuch as the treatment is nearly identical with that of syphilis. Cauterization may, however, be used more freely, especially where any peripheral deposits are detected. Mercury is injurious; cod-liver oil is of the greatest efficacy; and the local iodine treatment, with ferric iodide internally, gives excellent results.

Those desperate cases remain to be considered in which tuberculosis of the throat has led to ulceration, and, as in these cases the lungs are also speedily involved, the prognosis is unfavorable from the beginning. The same may be said of cases in which syphilis has been contracted by persons already decidedly phthisical, or where the cachexia of syphilis, added to privations or injurious modes of living, has led to pulmonary tuberculosis. In such cases the appearance of deep ulcerations of the throat is an ominous symptom. It is idle to discuss the question whether such ulcers are tuberculous or syphilitic; the two conditions do not exclude each other; their local symptoms are microscopically nearly identical; their combination is practically fatal.

CASES WITH AUTOPSY.

By Elbridge G. Cutler, M.D., *Pathologist.*

Chronic Ulcer of the Duodenum; Congenital Absence of the Left Kidney and Ureter. [Medical Records, Vol. 1, p. 163.] — The patient, a house-painter, 50 years old, had been well till within six or eight years, when he began to suffer from occasional attacks of distress in the epigastrium, vomiting, and constipation. Similar seizures occurred at intervals subsequently; but several were more severe, and were accompanied by hæmatemesis. At entrance to the hospital he had daily suffered from nausea and vomiting for a long time, with distress in the epigastrium, and constipation, and had lost flesh and strength. He gradually became worse, and died after several hemorrhages. At the *autopsy* the cause of the hemorrhage was found in an oval ulcer, an inch in diameter, with abrupt indurated edges, situated on the posterior wall of the duodenum, just outside the pyloric end of the stomach. The base of the ulcer had reached nearly through the muscular coat of the duodenum, and behind it was a portion of the head of the pancreas. An eroded vessel, evidently an artery, with a small clot protruding from its extremity, opened into one end of the ulcer. On dissection this proved to be a branch of the pancreatico-duodenalis superior. The stomach was distended with fluid and gas, and measured fourteen inches long; its muscular and mucous coats were thickened. The latter was of a brownish-gray or slaty color, and the epithelium was more opaque than normal. An unusual amount of very tenacious mucus covered its surface. The contents of the stomach and upper part of the small intestine were a brownish coffee-colored fluid, with a neutral odor.

The following interesting anomaly was discovered. The left supra-renal body was of the normal size and shape. No

left kidney or ureter was found. The left spermatic vein, of normal size, ended at right angles in a vein of the same size as the right renal vein, and which came from the left supra-renal body and terminated in the vena cava inferior. The arterial supply of the left supra-renal body was by means of two arteries the size of knitting-needles, which were given off in the usual locality. Nothing like a renal artery on the left side was given off, and nothing at its usual position was found suggestive of even an attempt at an artery. The right kidney was about the ordinary size, of normal healthy appearance, weighed a little over five ounces, and had eleven papillæ, one of which was a double one. The vascular supply of the kidney was normal, its ureter did not differ from the usual appearance. The right supra-renal body was not abnormal.

On opening the bladder the *trigone vesicæ* varied from the normal in that the left portion of it was wanting. The right ureter opening, the urethra, and the muscular band between them, were there; but on the left neither opening, dimple suggestive of it, nor muscular band, were seen. It is to be regretted that the testes and vesiculæ seminales were not examined in reference to any difference in size which might have existed, in view of the assertion of Beumer [*Virchow's Archiv*, *Band* LXXII., *Heft* I., *1878*] that such have occurred in a fourth of the cases examined. The kidney was considered at the time of the autopsy to be within the normal limits of size and weight, the man being somewhat above the average height. In the histories of the forty-four cases collected by Beumer, the single kidney is spoken of as larger than normal in the majority of instances. The right kidney was absent about as often as the left, and the anomaly occurred much more frequently in males. In almost all the cases the renal artery of the corresponding side was wholly absent, while in one case a rudimentary artery of extremely small size ran into the neighboring connective tissue. The ureter, like the artery, was wanting, though less frequently; in seven cases only the lower part was found; in two cases it was of the normal length. In some cases an angle of the trigonum vesicæ or the ureter depression were absent in the bladder when kidney

and ureter were both lacking. The supra-renal body was present on the anomalous side in a large majority of cases; in several it was not mentioned in the account of the case; in two it was enlarged, and in five it was wanting. Arrest of development in the sexual organs on the corresponding side was more frequently observed than absence of the supra-renal body. There was either absence of the testis and vas deferens, or they were present, but much diminished in size. Sometimes the vesicula seminalis was very small. The uterus was two-horned, the ovary and fallopian tube very small or absent, and the corresponding side of the vagina narrower than the other half. In rather more than half the cases the single kidney was perfectly healthy. Concretions and stones were observed in the renal pelvis and ureter in ten cases.

Ulcer of Duodenum with Perforation; Peritonitis; Cancer of the Œsophagus; Perforation into lowermost branch of Right primary Bronchus. [Medical Records, Vol. 156, p. 151.] — The patient was a sailor, and gave little history of trouble previous to three weeks before entrance, when he was attacked with hiccough and dysphagia, with paroxysms of coughing. Soon the physical signs of consolidation in the right lung were found, and the patient died in collapse, after repeated attacks of severe pain in the abdomen.

At the autopsy the abdomen was found to be distended by a large volume of gas in the peritoneal sac. The peritoneum was injected, and its surface dull and dry; there was but slight adhesion of the folds of intestine to each other. On carefully separating the viscera and lifting up the liver a small perforation was observed in the anterior wall of the duodenum, just below the pyloric orifice of the stomach. The edges of the perforation were shreddy, and on the serous surface a thin false membrane, one or two lines in breadth, surrounded it.

On opening the stomach and duodenum an ulcer of irregular shape was seen in the latter, extending from just without the pyloric orifice two inches down the posterior wall of the duodenum. The ulcer was sinuous, irregularly figure of eight shaped and deep; its floor being formed by the connective tissue immediately underneath the muscular coat. Perfora-

tion had occurred in the upper portion of the ulcer, on the anterior wall of the bowel, a small portion of the ulcer having extended round towards the front.

The mucous membrane of the stomach was grayish, opaque, thickened, and covered with an abundant secretion of tenacious mucus.

In the œsophagus there was a new growth commencing, just above the bifurcation of the trachea, and extending about two and a half to three inches downwards. Extensive ulceration had occurred, with perforation into one of the posterior and lowermost branches of the right primary bronchus. The muscular coat of the œsophagus was much thickened above the new growth. There was a very considerable stricture of the organ. Microscopic examination showed it to be cancer. At the lower end of the œsophagus posteriorly, and very near the cardiac opening, there was an oval loss of substance in the mucous membrane about the size of the ball of the thumb. Its edges were sharp and clean cut, and it reached a very considerable depth into the muscular layer. There was a slight infiltration of the edges, and microscopic examination revealed nothing like cancer. It appeared exactly like the well-known round ulcer of the stomach.

In the lower lobe of the right *lung* there was a large cavity, with shreddy walls, filled with a sour-smelling, dark brownish-green colored fluid. Perhaps two thirds of the lower lobe was included in this disorganized portion of lung. In the lower and lateral part of the lobe the cavity approached very closely to the pleural surface, and there was quite an extensive recent inflammation of this portion of the visceral pleura. The color and odor of the fluid found in the lung were similar to that in the stomach, and it seemed evident that the latter was the source.

The duodenal ulcer was, undoubtedly, chronic, and there had been, without question, symptoms dependent on it; but the marked symptoms connected with the œsophagus at the time of entrance, and the stupidity of the patient, rendered it difficult to get a clear idea of them. Perforation of the œsophagus occurred soon after he was admitted, and the penetration of portions of food into the lung gave rise to

signs of consolidation. The shreddy appearance of the lung seen at autopsy was, unquestionably, due to post-mortem digestion, — a portion of the contents of the stomach being forced up through the œsophagus, by the gaseous distention of the abdomen dependent on the peritonitis. The appearance in the lower end of the œsophagus I can explain in no other way than by assuming that the same process had occurred as that seen in gastric ulcer. In making this statement I bear in mind the assertion to the contrary of *Zenker* and *Von Ziemssen*, in the Cyclopædia of Medicine, Vol. VIII., 1878, p. 162. I would refer the reader to a paper in point by Quincke, in the *Deutsches Archiv für clinische Medicin*, Vol. 24, p. 74, 1879, entitled *Ulcus œsophagi ex digestione*.

Aneurism of the Cœliac Axis; Rupture. [Medical Records, Vol. 158, p. 151.] — A negro coachman, thirty years of age, previously well, came to the hospital, saying that two months before he had begun to suffer from vertigo, burning at the epigastrium after eating, and tympanites. Four weeks later he was obliged to take to his bed because of a severe pain, which was located in the umbilical region, and was constantly present. Complaint was made of "beating" at the seat of pain. The latter was "dull and pressing," and was accompanied by occasional "cramps," and was increased by a full inspiration and by motion. Vomiting had been a frequent complication with distress after eating. Profuse ptyalism had existed about a month. Just above the umbilicus, and to the left side, there was a circumscribed, very tender spot, where a systolic bruit was heard. There was no thrill. A few days later this portion of the abdomen was more prominent, and it was discovered that pressure made on it with the hand increased the ptyalism.

At the autopsy about sixteen ounces of bloody serum were found within the peritoneum on opening the abdomen, together with a clot as large as two fists lying in the left lumbar region. The aorta was affected with diffuse chronic endarteritis, and there was an aneurism of the cœliac axis, as large as an eight months' fœtal head, which had ruptured.

The aneurism had involved the pancreas, and caused absorption of a portion of it; the head being situated on one side and a part of the body on the other, the intervening portion being entirely gone. The other organs were not specially diseased. There was no other evidence of syphilis.

Aneurism of the Cœliac Axis; Rupture into the Abdomen. [Nervous and Renal Records, Vol. 5, p. 169.]—The patient first complained of a pain in the epigastrium on lifting heavy articles, several months before entrance, and one month ago observed a throbbing near the xyphoid cartilage. There was dulness on percussion from the xyphoid cartilage to the umbilicus, and extending a little on each side of the median line, covering a space four inches wide. Over this region of dulness a whistling bruit was heard, separate from the cardiac sound, and loudest to the left of the median line. Death occurred suddenly a few days later.

At the post-mortem examination a recent clot, large enough to fill an ordinary wash-basin, was found in the peritoneum, together with a somewhat greater amount of serum. On opening the aorta the cœliac axis was found in a state of aneurismal dilatation, the opening into the aorta being as large as the points of four fingers. The aneurism itself was about the size of the fist, and was lined with a layer of fibrine one-eighth of an inch in thickness. The pancreas was pressed upon by the mass; but, as far as could be determined, the gastric, splenic, and hepatic arteries were not involved. Rupture had occurred in two places; at the pyloric end of the aneurism, posteriorly, and towards the splenic end. The greatest amount of blood had been poured out on the right side of the abdomen. There was chronic endarteritis throughout the entire extent of the aorta, and in places in the other systemic vessels.

Aneurism of the Aorta, just above the Aortic Valves, the size of a pigeon's egg; Rupture into the left Auricle. [Medical Records, Vol. 158, p. 226.]—A week before the patient was admitted, he first had palpitation and dyspnœa, followed by cough and frothy expectoration. The action of the heart

was tumultuous; a systolic murmur was heard at the apex of the heart, propagated laterally; orthopnœa and death followed in twenty-four hours.

At the autopsy the lungs were both highly injected and œdematous; numerous punctiform ecchymoses were scattered over the surface of the pleuræ. The bronchial mucous membrane was extremely cyanotic.

The heart was of good color and consistence; it was not hypertrophied. The mitral valve was normal. An aneurism of the aorta, the size of a pigeon's egg, was discovered in one of the sinuses of Valsalva, not involving the coronary artery. It was filled with recent loosely coagulated blood, and, on gently removing this, it was found that the aneurism had ruptured into the left auricle; the opening being large enough to admit the little finger. There was recent endarteritis of the aorta throughout the greater part of its entire length, and of its various branches. There was a good deal of punctiform ecchymosis in the interventricular septum of the heart and under the visceral layer of the pericardium.

Chronic Parenchymatous Nephritis; Hydronephrosis. [Medical Records, Vol. 168, p. 79.] — The patient was 37 years old, and had suffered from several attacks of acute articular rheumatism, and had also had gonorrhœa a number of times. He entered the hospital complaining of dyspnœa and palpitation on exertion, and œdema of the feet and legs. The area of cardiac dulness was increased; there was a soft systolic souffle at the apex, and a harsh, rasping murmur heard over the aortic valves, with the second sound. On examining the abdomen there was found to be an unusual prominence on the right of the median line in the umbilical region. It was caused by a symmetrically ovoid swelling, dull on percussion, fluctuating, without tenderness, of the size of a large cocoanut, and which the patient had had since his seventeenth year. The dulness extended far back on the right side. After a few days the patient had increase of dyspnœa, with rusty sputa and cough, together with slight elevation of temperature; while a physical examination revealed crepitant râles throughout the right lung.

The urine was of very low specific gravity; contained two per cent. of albumen, and large numbers of granular and fatty casts, together with renal epithelium. The dyspnœa continued to increase in spite of all measures looking toward relief, and the patient finally died, comatose.

At the autopsy there was found to be red hepatization of the whole right lung; the left ventricle of the heart was much hypertrophied; the valves were healthy. The left kidney weighed seven and three-quarters ounces, and was of a dull whitish-yellow color. The urinary tubules were opaque, and on microscopic examination were seen to have an extremely granular and fatty epithelium, and in many places to be filled with casts. The tumor in the right side was observed to be the remains of the right kidney, which was represented by an enormous fibrous sac, with several irregular protuberances, evidently the former calyces. No kidney substance remained; the ureter was of normal size and pervious; it entered the sac at a right angle with its largest diameter, which was in the axis of the body, and under a thin, valve-like membrane some two inches in length, like the opening into the bladder.

The right renal artery and vein were not abnormal either in size or in position. The sac contained about two quarts of clear fluid. It had a specific gravity of 1,009; its reaction was neutral, and there was a large amount of albumen in it.

Case of Sporadic Cerebro-Spinal Meningitis; Death on the fourth day. — The patient had been well up to Monday, April 28th, 1881, when he went to his room and took to his bed with general malaise. Tuesday he was in bed all day, complaining of moderate headache. On Wednesday morning, at ten o'clock, he was found in a stupor, and during the rest of the day he had general convulsions every hour and a half. Thursday morning he had brightened up, and said he had passed no urine for many hours. He was brought to the hospital about twelve o'clock; ether was administered to control the convulsions, and a very large amount of urine was withdrawn by the catheter, in four sittings. Death occurred about four hours later.

At the *autopsy* the body was found to be well developed and fairly nourished. There was lividity of the dependent portions. Rigor mortis was present. There was considerable injection of the skin over the testes, with excoriations, as if it had been severely scratched.

Head. — The superior longitudinal sinus contained a firm thrombus at its lower portion, filling the cavity of the vessels, and apparently secondary to thrombi in those vessels of the pia running into it. On removing the dura the pia over the convexities was found to have a rather dull surface, and a homogeneous yellowish-green color, from the presence of a large amount of sero-purulent fluid in its meshes. The vessels of the pia were plainly seen, owing to their being filled with blood, and the purulent layer being more marked along their course. A slight sero-purulent fluid had gravitated to the loose meshes of the pia at the base of the brain.

Cord. — Along the course of the vessels, and in the meshes of the pia, there was considerable sero-purulent fluid, especially in the lumbar region and posterior surface of the cord.

The *pericardium* contained a few drachms of clear fluid; there were a few "milk-spots" on its surface. Both the cavities of the *heart* were exceedingly lax: the right side contained a moderate quantity of firm coagula; the left side was empty. There was general bloody imbibition of the heart, and moderate post-mortem softening. The left *lung* was free; the right one was adherent. There was hypostasis of both. The *spleen* was not remarkable, though, possibly, its pulp was very slightly increased. The *kidneys* were normal in size. The pelvis of each contained considerable purulent fluid, which was also found in the ureters and bladder. To the unaided eye the cortex and medulla appeared healthy; but a microscopic examination revealed a very slight, though diffuse, fatty degeneration of the epithelium of the convoluted and straight tubules, with fatty, granular detritus in the straight tubules, and here and there hyaline casts. The *bladder* contained several ounces of urine; there were numerous ecchymoses in the mucous membrane of the posterior part of the fundus. The *stomach* and *intestines* were not unhealthy.

STATISTICS OF AMPUTATIONS.

By Herbert L. Burrell, M.D.

AMPUTATIONS AT THE SHOULDER-JOINT. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Result.	Remarks.
1.	M.	17	Compound fracture of humerus	Recent . . .	Larry's	Death, 24 hours . .	Shock. Lister dressing.

AMPUTATIONS OF THE ARM. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	F.	5	Compound comminuted fracture of humerus	Recent . . .	Flaps	Upper third	Death, 23 hours . . .	Collapse.
2.	M.	8	" " " "	" . . .	"	" "	Recovery, 29 days .	Tr. benzoin. comp. Suppuration.
3.	M.	16	" " " "	" . . .	"	" "	" 30 " .	Lister dressing. Suppuration.
4.	M.	30	Compound fracture of humerus	" . . .	Circular . .	Lower third	" 28 " .	Lister. Alcoholismus.
5.	M.	17	" " "	" . . .	Flaps	Upper third	" 5 weeks .	Lister.

Recovered 4
Died 1
Total 5

Cause of death: Collapse 1

AMPUTATIONS OF THE ARM. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Place.	Result.	Remarks.
1.	F.	52	Gangrene of arm	18 days . . .	Flaps	Upper third	Death, 20 days . . .	Lister. Death probably from pulmonary embolism.

AMPUTATIONS OF THE FORE-ARM. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	35	Compound comminuted fract. of carpus	Recent . . .	Circular . .	Middle . . .	Recovery, 32 days .	Slight sloughing.
2.	M.	28	" " " fore-arm	" . . .	" . .	" . . .	" 34 " .	Lister. Slight suppuration.
3.	M.	25	" " " "	" . . .	Flaps.	Upper third	" 32 " .	Lister. Intermediate hemorrhage.

Recovered 3

AMPUTATIONS OF THE FORE-ARM. (Traumatic, Secondary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Methods.	Place.	Result.	Remarks.
1.	M.	38	Wound of arm	6 days . . .	Flaps	Lower third	Recovery, 35 days .	Lister.
2.	M.	22	Compound fracture of radius	10 " . . .	"	Middle . . .	" 6 weeks .	Carbolic wash dressing.

Recovered: . . . . . 2.

AMPUTATION AT THE HIP-JOINT. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Result.	Remarks.
1.	M.	42	Osteo-Sarcoma of femur	4 years . . .	Flaps	Death, 5 days	Lister. Death occurred from exhaustion.

AMPUTATIONS OF THE THIGH. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	25	Compound fracture into knee-joint	Recent . . .	Flaps . . .	Lower third.	Recovery, 40 days .	"White swelling" of knee for 20 years before accident. Anchylosed at 60°.
2.	M.	49	Compound comminuted fracture of leg	" . . .	" . . .	" "	Death, 10 hours . . .	Shock.
3.	M.	19	" dislocation of knee	" . . .	" . . .	Middle.	" 9 " . . .	Shock.
4.	M.	11	" comminuted fracture into knee	" . . .	" . . .	Lower third.	Recovery, 81 days .	Suppuration. "Strawberry-box" extension.
5.	M.	10	" " " of femur	" . . .	" . . .	Upper third.	" 64 " .	Sloughing of flaps.
6.	M.	52	" " " "	" . . .	" . . .	Lower third.	Death, 6 days	Lister. Severe shock. Exhaustion.
7.	M.	36	" " " leg	" . . .	" . . .	Middle.	Recovery, 100 days .	Lister. Slight suppuration.
8.	M.	28	Rupture of quad. ext. femoris. Hæmatoma	" . . .	" . . .	"	Death, 14 hours . . .	Shock.

Recovered 4
Died 4
Total 8

Cause of death: Shock 3
Exhaustion . . 1

Amputations in upper third 1
" " middle " . . . . . 3—2
" " lower " . . . . . 4—2 } Fatal.
Total . . . . . 8—4

AMPUTATIONS OF THE THIGH. (Traumatic, Secondary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	8	Compound dislocation of knee. Separation of epiphysis of femur	26 days	Flaps	Upper third	Recovered, 36 days	Joint was destroyed and pus dissected up shaft of femur.
2.	M.	36	Gun-shot wound of leg	2 months	"	Middle	Death, 11 days	Pyæmia. Exhaustion.
3.	M.	38	Fracture of leg. Hæmatoma	6 days	"	Lower third	" 44 hours	Alcoholismus. Lister. Exhaustion.

Recovered 1
Died 2
Total 3

Cause of death. Pyæmia 1
Exhaustion . . 1

AMPUTATIONS OF THE THIGH. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Place.	Result.	Remarks.
1.	F.	29	Ostitis of tibia	17 months	Flaps	Lower fourth	Reamputated, 6 mos.	Necrosis. *Vide* No. 5.
2.	M.	8	Necrosis of femur	2 years	"	" "	Recovery, 10 weeks	Suppuration.
3.	M.	43	Pulpy degeneration of knee-joint	4 "	Cardigan	" "	" 10 months	Lister? Acute nephritis delayed recovery.
4.	M.	16	Suppurative periostitis of femur	2 months	Flaps	Upper third	" 2 "	Lister. Suppuration.
5.	F.	29	Necrosis of femur. (Stump)	23 "	"	Middle	Death, 7 months	Necrosis continued. Femur was ablated. Primary hemorrhage. Shock. Death.
6.	M.	3	" " "	3 "	"	Lower third	Recovery, 1 month	Lister. Slight suppuration.
7.	M.	18	Round-cell sarcoma of fibula	7 "	"	Lower fourth	" 81 days	Lister. Slight slough. Necrosis of end of femur.

Recovered 6
Died 1
Total 7

Cause of death: Hemorrhage and shock 1

AMPUTATIONS AT THE KNEE-JOINT. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Result.	Remarks.
1.	F.	30	Compound fracture of leg	Recent . . .	Condyles removed .	Death, 10 weeks . .	Erysipelas. Exhaustion.
2.	M.	3	" comminuted fracture of leg	" . . .	. . . .	Reamputated, 3 mos.	*Vide* Amputations of Thigh (Pathological), No. 6.

Recovered 1
Died 1
Total 2

Cause of death: Exhaustion 1

AMPUTATIONS AT THE KNEE-JOINT. (Traumatic, Secondary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Result.	Remarks.
1.	M.	22	Compound comminuted fracture of leg	20 days . . .	Flaps	Death, 14 days . . .	Lister. Exhausted by suppuration.

AMPUTATIONS AT THE KNEE-JOINT. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Result.	Remarks.
1.	M.	40	Chronic ulcer	8 years . . .	Flaps	Recovered, 6 weeks .	Lister. Slight suppuration.
2.	F.	41	Necrosis of tibia	1½ " . . .	Condyles removed .	" 7 "	Lister. Slight sloughing.

Recovered 2

AMPUTATIONS OF THE LEG. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	28	Compound dislocation of the ankle	Recent	Flaps	Middle	Recovery, 2 months	Suppuration.
2.	M.	77	" comminuted fracture of tarsus	"	"	Lower third	Death, 34 days	Lister? Pyæmia.
3.	M.	66	" " " " leg	"	Circular	Upper third	" 13 "	Delirium tremens. Exhaustion.
4.	M.	35	" " " " "	"	Flaps	" "	Recovery, 72 days	Suppuration.
5.	M.	14	" " " " "	"	"	" "	Reamputated, 68 days	*Vide* Amputations of the leg. (Traumatic, Secondary.) No. 2.
6.	M.	27	" " " " tarsus	"	"	Lower third	Death, 5 days	Lister. Concussion of Brain. Exhaustion.
7.	M.	60	" " " " leg	10 hours	"	Middle	Recovery, 10 weeks	Alcoholismus. Lister. Sl. sloughing.
8.	M.	28	" " " " "	Recent	"	"	" 7 "	Lister. Slight suppuration.
9.	M.	32	" " " " tarsus	"	"	Lower third	" 6 "	Lister. Suppuration.
10.	M.	6	" fracture of tibia	"	"	Upper "	" 6 "	"Lister without spray." Slight sloughing.
11.	F.	60	" comminuted fracture of leg	"	"	" "	" 3 months	Lister. Extensive sloughing. Delirium tremens. Erysipelas.
12.	M.	52	" " " " "	"	"	" "	" 5 weeks	Lister.

Recovered 9
Died 3
12

Cause of death: Pyæmia 1
Exhaustion 1
Cerebral concussion 1
3

AMPUTATIONS OF THE LEG.—(Traumatic, Secondary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	32	Compound comminuted fracture of tarsus	3 weeks . .	Flaps	Upper third	Recovery, 95 days .	Lister. Hemorrhagic diathesis.
2.	M.	14	Necrosis of tibia	68 days . . .	"	" fourth	" 36 " .	" No suppuration.
3.	M.	10	Compound fracture of tibia	21 " . . .	"	" "	" 6 weeks .	" Slight suppuration.
4.	M.	24	" comminuted fracture of leg	11 " . . .	"	" third	" 7 weeks .	" Sloughing. Del. tremens.

Recovered 4

AMPUTATIONS OF LEG. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Place.	Result.	Remarks.
1.	M.	55	Necrosis of tarsus	2 months	Flaps	Lower third	Reamputation, 7 mos.	Vide No. 5. Syphilis.
2.	M.	62	Senile gangrene	5 "	Teale's	Middle	Death, 18 days	Gangrene extended. Exhaustion.
3.	M.	38	Necrosis of tarsus	8 "	"	Lower third	Recovery, 6 weeks	Suppuration.
4.	M.	24	" "	14 "	"	" "	" 10 "	Lister. Suppuration.
5.	M.	55	Ulceration of stump	7 "	Flaps	Middle	" 7 months	Lister. Sloughs.
6.	M.	66	Carcinoma of leg	1 year	"	Upper third	" 124 days	Lister. Intermediate hemorrhage from popliteal. Femoral ligated.
7.	M.	22	Ulceration of stump	6 months	"	" "	" 37 "	Lister. Slight suppuration.
8.	M.	21	Frost-bite of leg	1 year	"	Lower "	" 64 "	Double amputation. Lister.
9.	M.	21	" "	1 "	"	Middle	" 72 "	
10.	M.	35	Ulceration of stump	1 "	"	Upper fourth	" 2 months	Lister. Slight suppuration.
11.	F.	25	Necrosis of tarsus	14 months	"	Lower third	" 6 weeks	Slight suppuration.

Recovered 10
Died 1
Total 11

Cause of death: Exhaustion 1

AMPUTATIONS AT THE ANKLE-JOINT. (Traumatic, Primary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Result.	Remarks.
1.	M.	24	Compound comminuted fracture of tarsus	Recent . . .	Chopart . . .	Recovery, 2 months.	Lister. Slight sloughing.
2.	M.	32	" " " "	" . . .	Syme's	Reamputated, 3 w'ks.	Hemorrhage from the anterior tibial. *Vide* Amputations of the leg. (Traumatic, Secondary.) No. 1.

Recovered . . . . . 2.

AMPUTATIONS AT THE ANKLE-JOINT. (Traumatic, Secondary.)

No.	Sex.	Age.	Nature of Injury.	Duration.	Method.	Result.	Remarks.
1.	M.	17	Compound comminuted fracture of tarsus	84 days . . .	Lisfranc . . .	Recovery, 30 days . .	Suppuration.
2.	M.	23	" " " "	24 days . . .	Chopart . . .	" 32 " . .	Lister. Slight suppuration.

Recovered . . . . . 2.

AMPUTATIONS AT THE ANKLE-JOINT. (Pathological.)

No.	Sex.	Age.	Nature of Disease.	Duration.	Method.	Result.	Remarks.
1.	M.	28	Necrosis of tarsus	2 years . . .	Pirogoff . . .	Recovery, 2 months.	Suppuration. Useful stump.
2.	M.	24	Frost-bite	6 weeks . .	Chopart . . .	" 12 weeks.	Same case. Double amputation. Walked in four months.
3.	M.	24	" "	6 " . .	" . . .	" 10 "	
4.	M.	53	" "	2 " . .	" . . .	" 15 "	Lister. Sloughing.
5.	F.	21	Necrosis of metatarsus	6 months . .	" . . .	" 10 "	"Antiseptic dressing" by syringing out drainage tube with carbolic, 1–80. Markoe's method.

Recovered . . . . . 5.

STATISTICS OF THE MAJOR AMPUTATIONS (371) AT THE BOSTON CITY HOSPITAL (1864-1880).

Place.	Traumatic, Primary.				Place.	Traumatic, Secondary.				Place.	Pathological.			
	Recovered.	Died.	Total.	Per cent. of Mortality.		Recovered.	Died.	Total.	Per cent. of Mortality.		Recovered.	Died.	Total.	Per cent. of Mortality.
Shoulder	10	8	18	44.44	Shoulder	1	1	2	50.00	Shoulder	1	. . .	1	. . . .
Arm	27	9	36	25.00	Arm	5	6	11	54.54	Arm	10	1	11	9.09
Elbow	1	. . .	1	. . . .	Elbow	. . .	. . .	. . .	. . . .	Elbow	1	. . .	1	. . . .
Fore-arm	21	1	22	4.54	Fore-arm	6	2	8	25.00	Fore-arm	10	2	12	16.7
Hip	. . .	3	3	100.00	Hip	. . .	. . .	. . .	. . . .	Hip	. . .	1	1	100.00
Thigh	21	37	58	63.00	Thigh	8	8	16	50.00	Thigh	24	9	33	27.02
Knee	4	3	7	42.85	Knee	. . .	3	3	100.00	Knee	3	. . .	3	. . . .
Leg	29	15	44	34.09	Leg	12	4	16	25.00	Leg	30	8	38	21 05
Ankle	6	2	8	25.00	Ankle	6	. . .	6	. . . .	Ankle	8	1	9	11.11